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THE MIAMI CONSERVANCY DISTRICT

REPORT OF THE CHIEF ENGINEER

ARTHUR E. MORGAN

SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

IN THREE VOLUMES

Volume I

DAYTON, OHIO

MARCH, 1916

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REPORT OF THE CHIEF ENGINEER OF THE MIAMI CONSERVANCY DISTRICT, SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

VOLUME I

Letter of Transmittal

Introductory

Synopsis of Plan

Part I. —Data on which Plan is based

Part II. —Development of the Plan

Part III.—Statement of the Plan

VOLUME II

Part IV.—Property Affected by the Plan

VOLUME III

Part V. —Contract and Specifications

Part VI.—Estimates of Quantities and Cost

Two volumes of Exhibits, containing 408 drawings, accompany this report, but have not been published in a form available for general distribution.

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LETTER OF TRANSMITTAL

February 29th, 1916.

To The Board of Directors
of
The Miami Conservancy District.

Gentlemen:—

Following the organization of The Miami Conservancy District by order of the Court on the 28th of June, 1915, the appointment of your Board on the 28th of June, 1915, as the Board of Directors of the District, and the appointment dated the 7th of July, 1915, of the undersigned as Chief Engineer of the District, with instructions to prepare a plan for the protection of the District from floods; he proceeded to prepare such a plan, which is herewith presented for your consideration, with the recommendation that it be adopted as the Official Plan of The Miami Conservancy District, as provided for in Section 12 of the Conservancy Act of Ohio. In the preparation of the plan, your engineers have supplemented and completed the data secured and work done by The Morgan Engineering Company under the direction of The Dayton Flood Prevention Committee. In the presentation of this plan, it has seemed advisable to outline in brief the data on which the plan is based, and a statement of the processes and methods employed in determining its various features.

When this plan is carried into effect the Miami Valley, in our opinion, will be permanently protected from serious damage by flood. In its necessity for flood prevention, the valley is not unique. Wherever, along the rivers of this country, industrial and agricultural development reaches a high stage, the protection of these interests from damage by uncontrolled flood waters becomes necessary, and must be secured before permanent prosperity is established.

The immediate cause for the movement for flood protection and the organization of The Miami Conservancy District, was the great flood of 1913. Here, as elsewhere, the movement for protection has waited until it should receive the impetus given by a single great disaster, though the necessity for protection from many smaller storms, and rarely from larger ones, always has been present, and will continue to be present until protection is secured. As the development of the valley progresses from year to year, the extent of the interests requiring protection from floods grows continually greater.

In the preparation of the plan a considerable amount of original engineering investigation has been carried on by the engineering force. The completeness of these investigations and accuracy of the final results are due in a large measure to the faithful and persistent efforts of various members of the force, and to the advice and counsel of the consulting engineers of the District. Reports on the investigations, and acknowledgments of the services which have made them successful are out of place in an official plan, but will be covered at a later date in a separate report. Other engineering organizations have been generous in supplying, without charge, data necessary on this work, and it would seem well to reciprocate by making the results of these investigations generally available.

Respectfully submitted,

ARTHUR E. MORGAN,
Chief Engineer.

REPORT OF THE CHIEF ENGINEER OF THE MIAMI CONSERVANCY DISTRICT, SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

INTRODUCTORY

The Miami Valley always has been subject to floods. One of the greatest occurred in 1805, less than ten years after the first settlement of the valley. The greatest of which we have detailed knowledge, but not necessarily the greatest that may occur, was that of March, 1913. Many other floods occurred between these two dates; small ones frequently, and greater ones at longer intervals. What has happened in the past indicates generally what will happen in the future, though our period of records is so short that we cannot safely draw conclusions as to the frequency of great floods in the future. The particular magnitude of the 1913 flood was accidental. Slight differences in weather conditions would have resulted in a flood either larger or smaller. Floods will occur somewhat larger, some will be only half as large. The next great flood probably will differ materially in size from the last, and floods half as great or two-thirds as great as that of 1913 may reasonably be expected to occur on an average with much greater frequency than floods of the magnitude of that of 1913. The Miami Valley, in its present condition, would suffer very great damage from a flood half as great as that of 1913—a damage doubtless exceeding in money loss the total cost of complete protection for the valley. So it is not against the greatest floods alone that protection is needed.

This being the case, it is necessary to decide how great a flood the cities of the valley should be protected from. Shall an improvement be planned to control a flood half as great as that of 1913, with

works that will prove inadequate perhaps once in 25 years; shall the standard be a flood two-thirds as great as that of 1913, with the chance that the works will prove inadequate once in 30 to 50 years; shall it be the 1913 flood, with corresponding works that will prove inadequate once in 50 to 150 years; or shall provision be made against the greatest possible flood, with works that will be adequate under all possible conditions?

The answer to this question depends upon the cost of different degrees of protection, the values to be protected, and the magnitude of the loss that will occur whenever work planned for partial protection fails.

It should be borne in mind that while the **average** frequency of a flood of a given magnitude may be fairly definite, the interval between any two successive floods will not be the **average** interval, but will be greater or less than the average. For instance, the two greatest floods of more than a quarter of a century on the Mississippi occurred in successive years, 1912 and 1913, and the next greatest in 1916. The two greatest floods ever recorded on the Sacramento River occurred within about five years of each other. The floods of 1881 to 1884 on the Ohio were the most extreme for a quarter of a century.

Taking all factors into consideration, we are of the opinion that the only right standard for The Miami Conservancy District is protection against the greatest possible flood, except in certain locations where minor damage from moderate overflow on low lying lands does not justify the cost of additional protection.

The purpose of the plan herewith presented for the improvement is so to control the greatest possible floods in the Miami Valley as to prevent loss of life and serious damage to property, both in the cities and in the farming districts. In general, the plans are sufficient for protection against floods 40 per cent greater than the flood of 1913.

The District, with the additions here recommended, includes the lands which will be benefited by the improvement, and also the lands and other property to be damaged or taken in carrying out the proposed work.

Very thorough studies of every possible type of flood prevention have been made, including channel improvements, diversions around towns and cities, levees, retarding basins, and cut-off channels. Only after every possibility had been carefully worked out was the proposed plan chosen as the most feasible and practicable.

SYNOPSIS OF THE RECOMMENDED PLAN

The recommended plan consists of a series of five retarding basins, located as shown on the map on page 22, supplemented by channel improvements through the cities. The retarding basins will be formed by dams built across the valleys of the Miami, Mad, and Stillwater Rivers, and on Twin and Loramie Creeks. Each dam will have permanent openings through its base through which the ordinary flow of the river and the flow during ordinary freshets will pass unimpeded. During large floods the water which cannot pass through the outlet conduits will be held back temporarily in the basins above the dams. The conduits are proportioned so that no more water can pass through them than can be carried safely in the improved channels through the cities below. In this manner, the runoff of a flood like that of 1913, which lasted but two or three days, would be distributed over a period of about two weeks and its height would be correspondingly reduced.

During the 1913 flood about 1,415,000 acre feet of water fell over the drainage areas above the proposed dams. (An acre foot is the amount of water required to cover an acre one foot deep, or 43,560 cubic feet). The total capacity of the retarding basins to the spillway level is 840,000 acre feet, or 60 per cent of the total rainfall of the 1913 flood. During the beginning of a flood, and again during its ending, when the flow is large, but not more than the channels will carry, nearly all will pass through the openings in the dams, and little or none will be stored. This leaves nearly the whole of the storage capacity of the basins available for cutting off the excess of flow when the main part of the flood is passing down the valley. Assuming, for the moment, that during a flood like that of 1913 all the rainfall would run off the ground surface, and none would be stored in the soil to run off slowly, there would remain 575,000 acre feet, or 40 per cent of the rainfall, to pass through the conduits. The conduits are planned of such size, however, that a considerably larger part of the flood flow assumed above would pass through them during this interval, so that a smaller part would be stored in the reservoirs, and the water consequently would not rise to the spillway level. As the river channels will be filled approximately to their full capacity during the entire time of the flood, it is only the peak of the flood, the part that the rivers cannot carry, which must be held back temporarily in the retarding basins. By improving the river channels through the cities as much as is reas-

onably practicable, the rate at which the water can be allowed to pass through the conduits is increased, and the amount that must be held back in the basins is lessened.

In general, the greatest rate of flow through the cities below the retarding basins in case of a storm like that of 1913 would be approximately half as great as the unmodified flow in 1913. The channel at Dayton when improved and enlarged will have sufficient capacity to carry somewhat less than half as much water as the maximum 1913 flow, and that at Hamilton to carry somewhat more than half; the remainder in each case being cared for by retarding basin control.

The principal dimensions of the dams are given in Table 17, page 107. The highest dam is that at Englewood, 120 feet above the valley, and the lowest is the Huffman Dam, 65 feet high. For the construction of all the dams, a total of about 9,000,000 cubic yards of earth and about 190,000 cubic yards of concrete will be necessary.

The local flood control works at the various cities will consist of widening and deepening channels, correcting sharp bends, raising and lengthening bridges, protecting the sides and bottoms of channels with concrete at critical points, and building levees. Detailed descriptions of these local improvements are included in Part III of this volume.

Construction can proceed on all of the channel improvements and on nearly all of the dam construction at one time. Three years of active construction work should be sufficient for the substantial completion of the project.

The following table gives the estimate of the total cost of each dam, and of each local channel improvement, the total of which is the estimated cost of the construction of the works included in the plan; following this total are items for public service relocations and damages, for real estate purchases and easements, for administration and general expense, and for taxes. To these is added an item for contingencies to cover possible changes in the cost of cement and other materials, of labor and of procuring rights-of-way. The total is the estimated maximum cost of completing the entire project.

Estimated Cost of Completion of Entire Project

Retarding Basins		
Germantown	$ 640,235	
Englewood	1,959,632	
Lockington	865,218	
Taylorsville	1,508,674	
Huffman	1,299,125	
		$ 6,272,884
Local Flood Protection		
Piqua	$ 128,801	
Troy	157,574	
Dayton	1,383,619	
West Carrollton	22,416	
Miamisburg	167,267	
Chautauqua	4,283	
Franklin	115,076	
Middletown	81,305	
Hamilton	1,274,962	
		$ 3,335,303
Total estimated cost of construction of the works included in the plan		$ 9,608,187
Public service relocations and damages		2,309,315
Real estate purchases and easements		5,664,200
Administration and general expense		1,758,170
Taxes and special assessments, during construction period, on lands acquired		200,000
Estimated cost without contingencies		$19,539,872
Contingencies		4,000,000
Estimated maximum total cost		$23,539,872

This report is presented in three printed volumes and two volumes of drawings. It includes: First, a condensed selection of some of the most pertinent and important facts from the great volume of technical and engineering data which has been accumulated in the course of the preparation of the plan; second, a statement of the more important principles governing the development of the plan; third, a more detailed description of the plan itself; fourth, a list of the property affected; fifth, forms to be used in advertising the work before letting contracts, forms of contract and bond, and a set of specifications for doing the work; sixth, estimates of quantities and costs; and seventh, a set of about 400 drawings, including plans of the work to be done, and topographic and property maps of the District.

PART I

DATA ON WHICH PLAN IS BASED

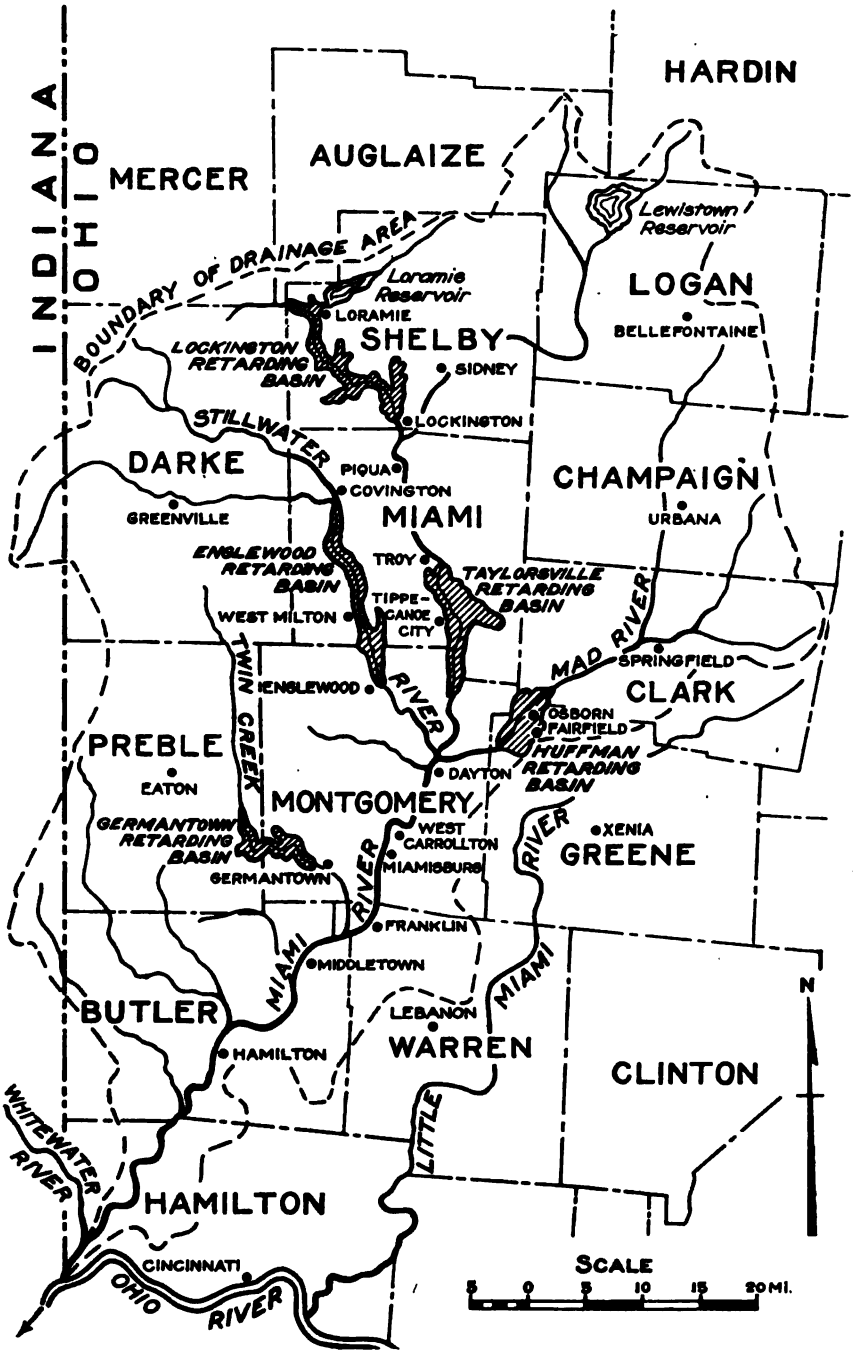


Fig. 1.—Map of Miami River drainage area showing location of proposed retarding basins.

PART I

DATA ON WHICH PLAN IS BASED

GEOGRAPHY OF THE DRAINAGE AREA

The Miami River drainage basin, excluding the Whitewater River, which joins the Miami only six miles above its mouth, lies almost entirely within the southwestern part of Ohio, as shown on the map, Fig. 1, and has an area of about 4,000 square miles. It includes parts of fifteen counties, namely, Hamilton, Butler, Warren, Preble, Montgomery, Greene, Clark, Miami, Darke, Shelby, Champaign, Logan, Mercer, Auglaize, and Hardin counties. The principal tributary streams in order of size are Mad River, Stillwater River, Four Mile Creek, Twin Creek, and Loramie Creek. The principal cities affected by the floods of the Miami River are Dayton, at the confluence of Mad, Stillwater, and Miami Rivers, and Wolf Creek; Hamilton, Middletown, Miamisburg, and Franklin on the Miami River below Dayton; Piqua, and Troy on the Miami River above Dayton.

The Miami River itself is about 163 miles in length, its drainage basin measuring about 120 miles on the longest axis, extending in a southwesterly direction from the Lewistown Reservoir to its confluence with the Ohio about 20 miles below Cincinnati. Dayton lies midway between the upper and lower extremities of the drainage area. The country is generally rolling and is nearly all cleared for cultivation. Dayton is at about 40° north latitude. The surrounding country lies about 800 to 900 feet above sea level. The mean annual rainfall is about 36½ inches.

Table 1 shows the population and the elevation above sea level of cities and towns in the Miami Valley. The population is taken from the 1910 census, and the elevations from the United States Geological Survey maps.

Table 1.—Population and Elevation in Feet above Sea Level of Cities in the Miami Valley

Name of City	Population	Elevation
Cleves	1,423	500
Dayton	116,577	740
Englewood	275	930
Fairfield	292	835
Franklin	2,659	680
Germantown	1,778	720
Hamilton	35,279	590
Lockington	166	930
Miamisburg	4,271	705
Middletown	13,152	650
Osborn	866	830
Piqua	13,388	870
Sidney	6,607	950
Springfield	46,921	970
Tippecanoe City	2,038	825
Troy	6,122	830
West Carrollton	1,285	720
West Milton	1,207	910

CAUSES OF FLOOD DAMAGE IN THE MIAMI VALLEY DURING THE FLOOD OF 1913

There were many incidental conditions which resulted in increase of flood damage at local points. The main cause of damage, however, was the excessive rainfall and consequent runoff which far exceeded the capacity of the channels for carrying away the water. The Miami River, like many other streams in all parts of the United States, is proportioned, not for carrying excessive flood waters, but for the ordinary flow. In case even of moderate floods, such as occur every one or two years, lowlands lying along the river are overflowed. As an indication of the complete inadequacy of the river channel for carrying the water of great floods, Tables 2 and 3 are added, showing the natural channel capacity at various points throughout the Miami Valley, the maximum 1913 flood discharges at the same points, and the ratio of the two quantities expressed as a per cent. The channel capacity was determined from the dimensions of the channel and the slope of the stream bed, and from meter measurements. The 1913 flood flow was determined as indicated later in this report. It will be seen that in some places the natural river channel has a capacity sufficient to carry less than 10 per cent of the flood of 1913. It will be noted also, that the capacity of the

Table 2.—Present Channel Capacities at Various Locations in the Miami Valley Outside of Towns and Cities, Compared with the 1913 Flood Discharge

Stream	Location	Channel Capacity	Flood Discharge	Ratio	Drainage Area	Remarks
		Second feet	Second feet	Per cent	Square miles	
Mad River	West of Springfield	5,000	55,400	9.0	488	No levees
Mad River	Below Osborn	*6,500	75,700	8.6	649	*To top of bank
Mad River	Below Osborn	*13,500	75,700	17.8	649	*To top of levee
Stillwater River	Above Covington	1,200	33,100	3.6	223	Practically no levees
Stillwater River	Below Covington	6,000	51,400	11.7	448	Practically no levees
Stillwater River	Above West Milton	7,000	86,200	8.1	600	Practically no levees
Loramie Creek	Northwest of Lockington	1,600	25,600	6.3	208	Practically no levees
Miami River	Above Sidney	5,000	34,100	14.7	498	Practically no levees
Miami River	Below Sidney	5,000	48,500	10.3	575	No levees
Miami River	Below Piqua	10,000	70,000	14.3	842	No levees
Miami River	Tadmor	*8,000	127,300	6.3	1128	*To top of bank
Miami River	Tadmor	*12,000	127,300	9.4	1128	*To top of levee
Miami River	Below Dayton	25,000	252,000	9.9	2598	No levees
Miami River	Below Miamisburg	35,000	257,000	13.6	2722	No levees
Miami River	Below Hamilton	25,000	352,000	7.1	3672	No levees
Miami River	Below Miamitown	20,000	384,000	5.2	3937	No levees
Twin Creek	West of Germantown	3,000	66,000	4.5	272	No levees

channel through the cities in most cases is from two to four times as great as through the adjacent agricultural lands where the river is in approximately its original condition. The average channel capacity, outside of towns and cities, is 9.5 per cent of the 1913 flood discharge. The average channel capacity in the cities is 33.8 per cent of the 1913 flood discharge.

Table 3.—Present Channel Capacities in the Cities of the Miami Valley Compared with the 1913 Flood Discharge

City	Channel capacity	Flood discharge	Ratio	Drainage area	Remarks
	Second feet	Second feet	Per cent	Square miles	
Sidney	10,000	44,000	22.7	555	High banks, small levees in places
Piqua	*25,000	70,000	35.7	842	*Above Penn. R. R., small levees
Piqua	*15,000	70,000	21.4	842	*Below Penn. R. R., small levees in places
Troy	*60,000	90,000	66.7	908	*Floods low areas on left of main channel
Troy	*20,000	90,000	22.2	908	*To top of levee above R. R.
Troy	*12,000	90,000	13.3	908	*To top of bank below R. R.
Dayton	90,000	250,000	36.0	2525	Above Wolf Creek levees
Dayton	100,000	252,000	39.7	2598	Below Wolf Creek levees
Miamisburg	65,000	257,000	25.3	2722	C. H. & D. R. R. fill acts as levee
Franklin	65,000	267,000	24.3	2785	Practically no levees
Middletown	115,000	304,000	37.8	3162	No levees, wide flood channel
Hamilton	100,000	352,000	28.4	3672	Levees above the city

PROBABILITY OF RECURRENCE OF GREAT FLOODS

There is a tendency to look upon a great flood as unprecedented and as likely never to occur again. As a matter of fact, great floods at long intervals are as much a part of the normal course of events as are smaller floods at more frequent intervals. The 1913 flood at Dayton, while extreme as compared with others in recent years, probably has been equalled or exceeded many times at long intervals in the past; and many other floods doubtless have occurred and will occur, not so great as that of 1913, but still far greater than

the capacity of the present channel of the river, and of the present protective works throughout the Valley. These conclusions are reached by a study of past floods in the Miami Valley, of rainfalls and floods in other parts of the Central United States, and of floods and flood conditions in Europe and other countries. These subjects will be discussed more in detail in the following pages.

THE FLOOD OF MARCH, 1913

Between March 23 and 27, 1913, a flood of unusual magnitude and destructiveness occurred in the Miami Valley. It was caused by very heavy rainfall, covering a period of five days, falling upon saturated ground.

All the cities and towns in the valley suffered much damage and the whole flood plain of the river valley was submerged to a depth of from 10 to 20 feet. Although the cities were protected by levees of sufficient height to withstand ordinary flood conditions, these levees were all overtopped several feet.

Nearly all highway and railroad bridges in the valley were put out of service for several days and many of them were completely destroyed. In the entire valley approximately 400 people lost their lives. The property damage exceeded $60,000,000, not including the depreciation of real estate, and has been estimated as high as $150,000,000. The cities sustaining the heaviest damage are Dayton, Hamilton, Piqua, Troy, Middletown, Franklin, and Miamisburg.

The general distribution of rainfall for the entire storm and for each of the several days of the storm is shown in the maps, Figs. 12 to 20, and Table 6 on pages 39 to 40. The following is a brief description of the progress of the flood at various cities in the valley:

Dayton

Monday, March 24, 1913: The Miami River rose slowly during the day, but with increasing rapidity as night approached. At midnight the water was within three or four feet of danger mark. Danger mark was considered as the 18-foot stage, which is about 3 feet below the top of the levees as then maintained.

Tuesday, March 25, 1913: The water rose very rapidly after midnight at a maximum rate of from one to two feet an hour, being about five feet above danger mark at 5 a. m. At daylight the river was overflowing the levee into Riverdale, both at Steele Dam and Lehman Street Pumping Station, and also into the western part of the city south of Wolf Creek. Some water was flowing over the levee in the central part of the city at this time. The river con-

tinued to rise very rapidly, breaking into the business portion between 8 and 9 a. m., and continuing to rise until about 2 p. m., when it came practically to a standstill. From this time, until the crest was reached, the water rose very slowly.

Wednesday, March 26, 1913: The water reached its crest about 1:30 a. m. (29-foot stage) less than a foot above where it stood at 2 p. m. on the preceding day, flooding the area shown on the map, Fig. 2, and being about 10 feet deep in the main business section of the city. From that time it fell slowly, reaching a point about four feet below the maximum by 5 p. m.

Thursday, March 27, 1913: The river fell steadily, the tops of the levees being in sight Thursday morning.

Friday, March 28, 1913: By Friday morning the river had fallen below the general ground level of most of the flooded area in the city, and all except Riverdale and some of the lower parts of the city were free from water.

Hamilton

The river began to rise on Monday and had reached a stage of 12 feet at 5 p. m. On Tuesday morning water began to flood the city and had reached the 20-foot stage at about eight o'clock. It continued to rise until 3 a. m., Wednesday, when it reached the crest at a stage of 38.5 feet. On Thursday (time not recorded) it had subsided to the 25-foot mark and at 5 p. m. Friday the gage read 18 feet. Most of the water had receded from the streets by that time.

The river continued to fall, and on Saturday the city became free from water except where there was no outlet opening for water to escape. Such places were mostly cleared during the day by opening sewer valves and cutting levees.

Piqua

The river rose during the day of Monday, March 24, and at 11 p. m. reached the highest stage previously recorded. The levees were overtopped and the canal flooded during the night. By morning the flood reached the floor of the Rossville Bridge. It continued to rise Tuesday until 10 a. m., then remained stationary for four hours, and at 2 p. m. began to subside. Water still covered many of the streets on Thursday morning, and Shawnee, a suburb, was still completely under water.

Fig. 3.—Map of Piqua, Ohio. Shaded area shows portion flooded in 1913.

Troy

At 10 p. m. Monday night the river had reached the danger mark and began to flood the lowlands north of the city. It continued to rise rapidly and had reached the highest known stage by 2 a. m. Tuesday morning. By daybreak it was flooding parts of the city, and by 10 a. m. nearly half the residence portion and practically all of the industrial sections were flooded. At 2 p. m. the water reached its crest, remained stationary for a short time and then began gradually to fall. Wednesday afternoon the water receded from many of the flooded streets, and the river returned to its channel on Thursday, except for portions of the city in which the water had become ponded.

Fig. 4.—Map of Troy, Ohio. Shaded area shows portion flooded in 1913.

FLOODED AREAS IN CITIES

As shown on the map of Dayton, Fig. 2, within the corporation limits the Miami River is joined by three tributaries—Mad River from the east, Stillwater River from the northwest, and Wolf Creek from the west. The Miami River makes three sharp bends within the city limits, forming a letter S. The river valley through the city is about a mile and a half or two miles wide and has been entirely covered by buildings and other improvements. The following bridges spanned the Miami, Mad, and Stillwater Rivers within the city limits of Dayton before the flood:

7 across the Miami below the mouth of Mad River.
2 across the Miami above the mouth of Mad River.
1 across the Stillwater River.
5 across the Mad River.

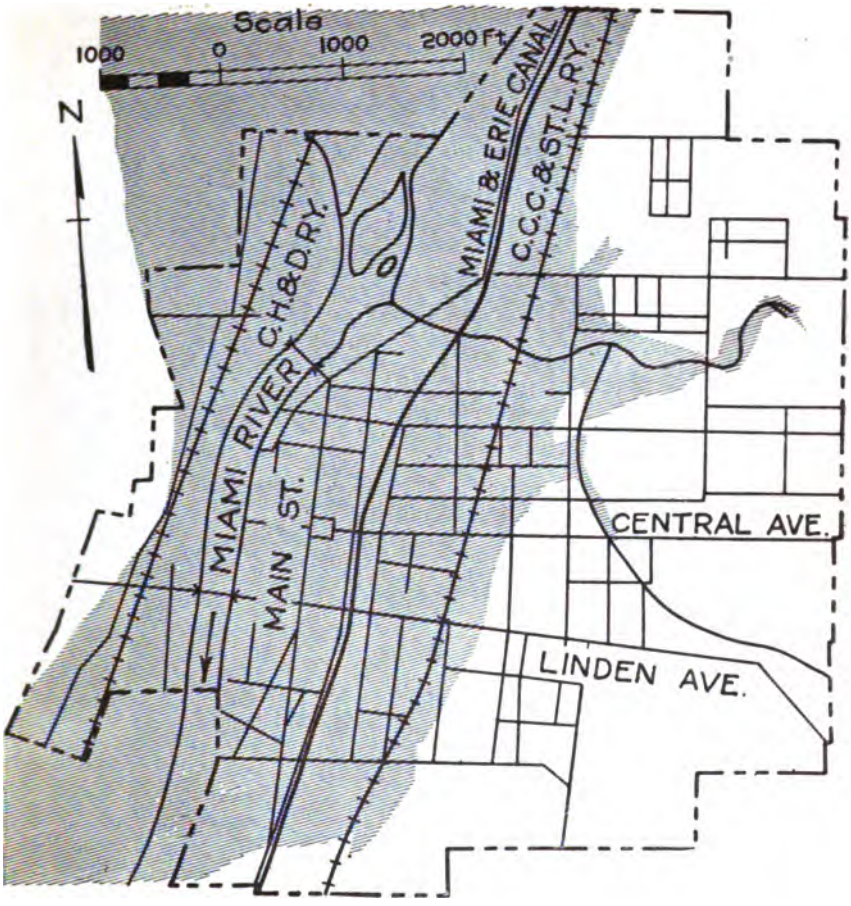


Fig. 5.—Map of Miamisburg, Ohio. Shaded area shows portion flooded in 1913.

The river gage is located at the Main Street bridge below the mouth of Mad River.

A large part of the city of Piqua lies within the flood plain of the river, which at this point makes a sharp U-shaped bend. The entire area in this bend was submerged during the 1913 flood, together with other portions of the city bordering the river. The area flooded is about one-quarter of the total area of the city. At the time of the flood, one railroad and four highway bridges crossed the river. One of the highway bridges was partly washed out, and one completely destroyed. A railroad bridge was under construction, but none of the steel had been placed. The river gage at Piqua is located on the Main Street bridge.

Fig. 6.—Map of Franklin, Ohio. Shaded area shows portion flooded in 1913.

Practically the entire city of Troy lies in the valley of the Miami River, but a considerable part of this area is comparatively high ground, and was not submerged by the 1913 flood. This is shown on the accompanying map, Fig. 4, by the unshaded portions, which comprise about one-half the area of the city. At the time of the flood, two highway bridges and one railroad bridge spanned the river, the latter of which sustained some damage. About one-third of the flood at its crest passed through the western part of the city, some distance back from the bridges. The flooded portion west of the river is about 2,000 feet wide, and that east of the river about 1,200 feet wide.

Fig. 7.—Map of Middletown, Ohio. Shaded area shows portion flooded in 1913.

At Miamisburg the flood plain is about a half mile wide. Two highway bridges cross the river at this point, both of which were destroyed by the flood. About one-half the area of the city was flooded.

At Middletown the valley is about two miles wide. All the city lies east of the river and about one-half of the total area was submerged.

Fig. 8.—Map of Hamilton, Ohio. Shaded area shows portion flooded in 1913.

Large portions of the city of Hamilton covering flat ground on both sides of the river, and comprising about half of the total area of the city, were completely submerged during the flood. Three highway bridges and one railroad bridge crossed the river, all of which were destroyed.

The maps, Figs. 2 to 9, show the flooded areas in the cities of Piqua, Troy, Dayton, Miamisburg, Franklin, Middletown, Hamilton, and Germantown. Table 4, on page 35, shows the area flooded in March, 1913, in the various cities and towns of the Miami Valley,

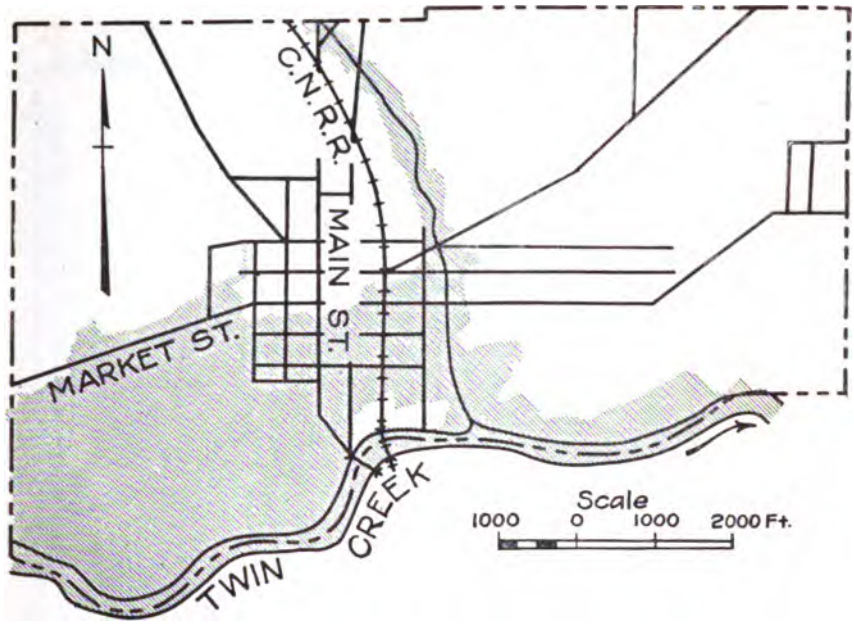


Fig. 9.—Map of Germantown, Ohio.
Shaded area shows portion flooded in 1913

and the ratio in each case of the flooded area to the total area of the city.

Table 4.—Area Flooded in March, 1913, in Towns and Cities

Name of City	Total area	Area flooded in 1913	Per cent flooded
	Acres	Acres	
Piqua	2,360	530	22
Troy	1,420	710	50
Dayton	10,630	4,670	44
West Carrollton	220	220	100
Miamisburg	840	440	52
Franklin	590	280	47
Middletown	1,550	750	48
Hamilton	3,710	1,760	47
Germantown	1,530	430	28
Osborn	220	70	32
Total	23,070	9,860	43

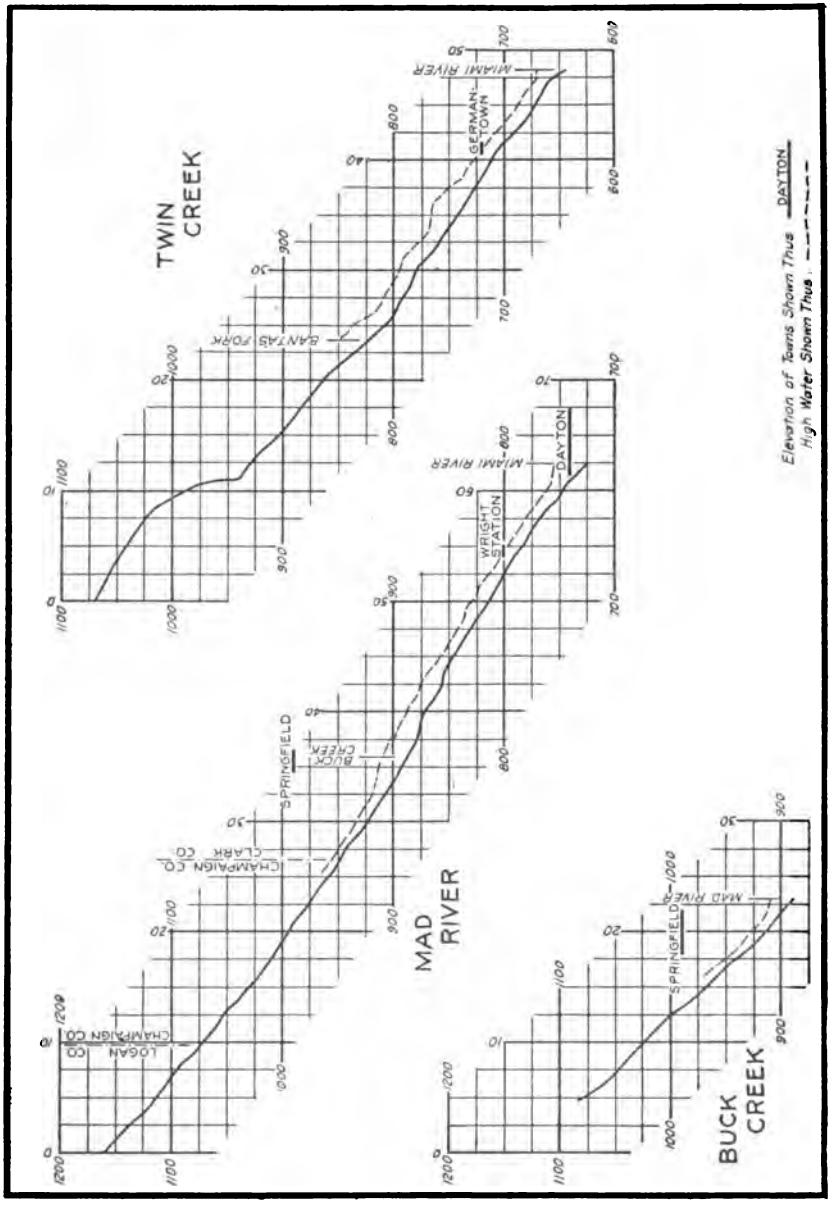
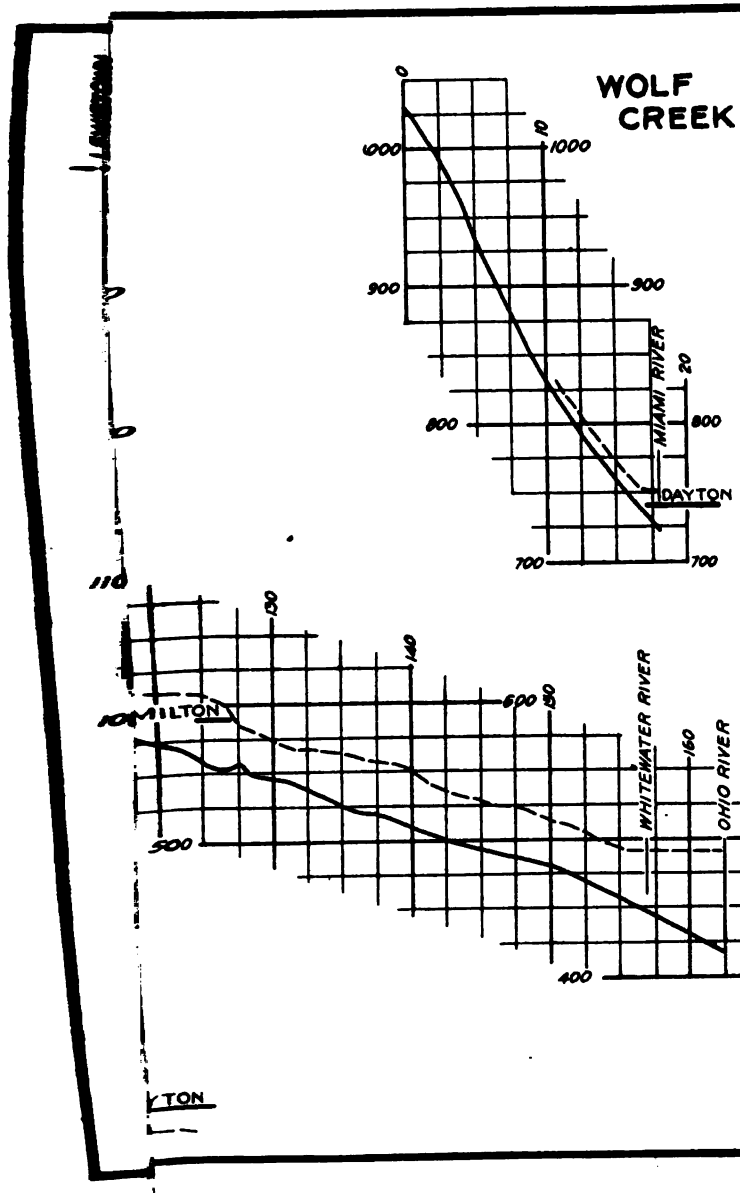


Fig. 10.—Condensed Profiles of Mad River, Buck Creek, and Twin Creek, showing high water line of March, 1913. Horizontal distances are in miles, vertical distances in feet.



March, 1913. Horizontal

PROFILES OF RIVERS AND FLOOD LINES

The condensed profiles, Figs. 10 and 11, show the grade of the main streams of the valley, the high water line reached in the 1913 flood, and the general elevation of the various cities with respect to the high water line. Table 5 shows the slopes of the various streams of the valley in feet per mile. These streams have a greater fall than is found in many streams throughout the middle portion of the Mississippi Valley. The data in Table 5 is compiled from the U. S. Geological Survey Topographical Maps.

Table 5.—Slopes of Streams in Miami Drainage Area

Stream	From	To	Distance	Difference in elevation	Drop per mile
			Miles	Feet	Feet
Miami River	Lewistown Reservoir	Sidney	29.2	62.0	2.1
Miami River	Sidney	Piqua	14.0	78.0	5.6
Miami River	Piqua	Troy	8.8	30.0	3.4
Miami River	Troy	Dayton	27.2	90.0	3.3
Miami River	Dayton	Miamisburg	14.5	50.0	3.4
Miami River	Miamisburg	Middletown	15.0	50.0	3.3
Miami River	Middletown	Hamilton	16.5	64.0	3.9
Miami River	Hamilton	11 miles above the Ohio River	26.0	85.0	3.3
Loramie Creek	Loramie Reservoir	Miami River	22.7	72.0	3.2
Spring Creek	Source	Miami River	12.1	226.0	18.7
Lost Creek		Miami River	16.7	267.0	16.0
Honey Creek		Miami River	10.1	113.0	11.2
Stillwater River		Englewood	52.0	218.0	4.2
Stillwater River	Englewood	Miami River	10.2	45.0	4.4
Mad River	North line of Clark County	Buck Creek	8.8	56.0	6.4
Mad River	Buck Creek	Dayton	26.7	156.0	5.8
Buck Creek		Mad River	12.2	126.0	10.3
Wolf Creek	Source	Miami River	17.2	301.0	17.5
Twin Creek	Euphemia	Miami River	35.2	282.0	8.0

RAINFALL CAUSING FLOOD OF MARCH, 1913

Table 6, based on the records published by the United States Weather Bureau, shows the rainfall measured in inches at the various stations in and around the drainage area of the Miami Valley, which produced the flood of March, 1913. The rainfall observing stations include three classes:

First, the regular telegraphic United States Weather Bureau stations. For these the day used in reporting the rainfall is from midnight to midnight.

Second, special stations established in some cases for reporting river gage heights, and in others for reporting rainfall. For these stations the day used is from about seven in the morning to seven the next morning, and the rainfall published for any given date is for the 24 hours ending at seven in the morning of that day.

Third, the cooperative U. S. Weather Bureau Stations. At these, the observers measure the daily rainfall at about seven in the evening and the rainfall reported for a particular day is the rainfall for the 24 hours preceding seven in the evening. Hence, in the same column for a particular date, the rainfall reported by one station may be for the 24 hours ending at seven in the morning, that reported by another station for the 24 hours ending at seven in the evening, and for still other stations for the 24 hours ending at midnight. The third class of stations, the cooperative observers, is much the most numerous. Hence, for purposes of comparison and study, in the table of rainfall, in addition to the records as previously published by the U. S. Weather Bureau for classes one and two, there is given an estimated distribution of these amounts reduced to the seven p. m. basis of class three.

Table 6.—Daily and Cumulated Rainfall, Measured in Inches, in and around the Miami Valley, During the Storm of March, 1913

	Daily Rainfall					Cumulated Rainfall				Rainfall up to
	Day of Month					Days of Month				
	23	24	25	26	27	23-24	23-25	23-26	23-27	
Stations in Ohio										
Bangorville	0.90	1.95	5.25	1.55	0.91	2.85	8.10	9.65	10.56	7 p.m.
Bellefontaine	1.37	1.52	5.61	2.13	0.53	2.89	8.50	10.63	11.16	7 p.m.
Bladensburg	0.51	1.21	2.63	1.87	0.70	1.72	4.35	6.22	6.92	7 p.m.
Camp Dennison	0.02	1.92	2.25	2.85	0.40	1.94	4.19	7.04	7.44	7 p.m.
Cardington	1.02	2.55	3.00	1.40	0.00	3.57	6.57	7.97	7.97	7 p.m.
Chillicothe	0.00	0.02	1.20		†4.60					7 a.m.
"	0.01	0.61	1.75	2.30	1.15	0.62	2.37	4.67	5.82	7 p.m.
Cincinnati (U. S. W. B.)	0.00	2.21	4.15	1.11	0.00					12 p.m.
Cincinnati (Hourly Record)	T.	2.21	3.10	1.81	0.35	2.21	5.31	7.12	7.47	7 p.m.
Circleville	0.15	1.50	1.97	2.29	0.37	1.65	3.62	5.91	6.28	7 p.m.
Columbus (U. S. W. B.)	0.53	2.14	2.89	1.40	0.01					12 p.m.
Columbus (Hourly Record)	0.53	2.04	1.91	2.05	0.44	2.57	4.48	6.53	6.97	7 p.m.
Dayton (U. S. W. B.)	0.48	2.95	§2.27		*†1.90					12 p.m.
Dayton (Co-operative)	0.51	2.91	3.28	1.48	0.76	3.42	6.70	8.18	8.94	7 p.m.
Delaware	1.12	2.00	2.46	1.87	T.	3.12	5.58	7.45	7.45	7 p.m.
Findlay	2.20	*2.00								7 p.m.
Frankfort	T.	1.20	1.67	2.20	1.42	1.20	2.87	5.07	6.49	7 p.m.
Greenville	1.29	1.77	4.45	1.41	0.41	3.06	7.51	8.92	9.33	7 p.m.
Hamilton	0.32	0.70	2.70		†3.80					7 a.m.
"	0.67	1.70	2.30	1.90	0.95	2.37	4.67	6.57	7.52	7 p.m.
Kenton	2.00	1.50	3.60	1.20	0.35	3.50	7.10	8.30	8.65	7 p.m.
Kings Mills	0.00	0.09	2.57	4.06	1.22					7 a.m.
" "	0.34	1.63	3.32	2.64	0.62	1.97	5.29	7.93	8.55	7 p.m.
Lima	2.20	1.34	3.35	0.62	0.40	3.54	6.89	7.51	7.91	7 p.m.
Marion	1.38	1.97	4.39	1.87	1.00	3.35	7.74	9.61	10.61	7 p.m.
New Bremen	2.06	1.80	3.22	1.22	0.30	3.86	7.08	8.30	8.60	7 p.m.
Ohio State University	0.60	1.89	2.42	2.54	0.41					7 p.m.
Ottawa	2.00	1.24	2.71	0.35	0.25	3.24	5.95	6.30	6.55	7 p.m.
Pataskala	0.50	1.66	2.37	2.12	0.43	2.16	4.53	6.65	7.08	7 p.m.
Peebles	T.	0.16	0.97	2.48	0.37	0.16	1.13	3.61	3.98	7 p.m.
Piqua (1)	0.00	*1.80								7 a.m.
Piqua (2)		5.59	*1.71							7 a.m.
Piqua (3)	0.00	2.87	*6.13							7 a.m.
Plattsburg	0.50	1.75	2.01	2.10	0.53	2.25	4.26	6.36	6.89	7 p.m.
Portsmouth	0.00	0.00	0.04	2.90	1.12					7 a.m.
"	0.00	0.02	1.47	2.01	0.56	0.02	1.49	3.50	4.06	7 p.m.
Sidney	1.28	1.84	3.96	1.32	0.38	3.12	7.08	8.40	8.78	7 p.m.
Springfield	0.53	2.01	3.57	1.90	0.67	2.54	6.11	8.01	8.68	7 p.m.
Upper Sandusky	2.00	2.15	3.50	1.19	1.57	4.15	7.65	8.84	10.41	7 p.m.
Urbana	0.62	2.13	3.12	2.25	0.54	2.75	5.87	8.12	8.66	7 p.m.
Wapakoneta	2.14	1.66	3.29	0.94	0.37	3.80	7.09	8.03	8.40	7 p.m.
Waverly	0.01	0.26	1.29	2.57	0.38	0.27	1.56	4.13	4.51	7 p.m.
Waynesville	0.35	2.15	2.56	2.30	0.33	2.50	5.06	7.36	7.69	7 p.m.

Table 6.—Daily and Cumulated Rainfall—(Continued)

	Daily Rainfall					Cumulated Rainfall				Rainfall up to
	Day of Month					Days of Month				
	23	24	25	26	27	23-24	23-25	23-26	23-27	
Stations in Indiana										
Anderson	2.34	1.50	2.51	0.50	0.14	3.84	6.35	6.85	6.99	7 p.m.
Bluffton	0.00	3.80	3.00	0.10	0.60					7 a.m.
"	1.90	3.40	1.55	0.35	0.30	5.30	6.85	7.20	7.50	7 p.m.
Cambridge City	0.00	1.70	5.70	1.18	0.80					7 a.m.
" "	0.85	3.70	3.44	0.99	0.40	4.55	7.99	8.98	9.38	7 p.m.
Connersville	0.68	1.85	5.67	1.46	0.32	2.53	8.20	9.66	9.98	7 p.m.
Farmland	0.00	2.07	4.42	0.78	0.77					7 a.m.
"	1.48	3.70	2.60	0.78	0.38	5.18	7.78	8.56	8.94	7 p.m.
Greenfield	1.25	2.56	2.32	1.00	0.15	3.81	6.13	7.13	7.28	7 p.m.
Greensburg	0.45	3.15	4.01	0.84	T.	3.60	7.61	8.45	8.45	7 p.m.
Huntington	1.80	1.05	1.95	0.30	0.30	2.85	4.80	5.10	5.40	7 p.m.
Marion	3.83	2.60	2.19	0.40	0.36					7 a.m.
"	3.83	2.40	1.29	0.38	0.18	6.23	7.52	7.90	8.08	7 p.m.
Mauzy	0.56	2.25	5.59	0.98	0.27	2.81	8.40	9.38	9.65	7 p.m.
Moores Hill	0.33	1.63	2.78	2.10	0.08	1.96	4.74	6.84	6.92	7 p.m.
Richmond	0.88	5.30	4.17	0.76	0.04	6.18	10.35	11.11	11.15	7 p.m.
Salamonia	3.55	1.16	3.04	1.08	0.21	4.71	7.75	8.83	9.04	7 p.m.
Vevay	T.	1.80	3.65	2.00	0.00	1.80	5.45	7.45	7.45	7 p.m.
Stations in Kentucky										
Falmouth	0.00	0.00	0.30	3.23	0.96					7 a.m.
"	0.00	0.15	1.77	2.09	0.48	0.15	1.92	4.01	4.49	7 p.m.
Maysville	0.00	T.	0.16	2.03	1.29					7 a.m.
"	0.00	0.08	1.09	1.67	0.65	0.08	1.17	2.84	3.49	7 p.m.
Scott	T.	2.86	1.50	2.38	0.23	2.86	4.36	6.74	6.97	7 p.m.
Williamstown	0.00	T.	0.40	3.97	0.82					7 a.m.
"	0.00	0.20	2.18	2.40	0.43	0.20	2.38	4.78	5.21	7 p.m.

* Record incomplete.
† Total amount from time of preceding reading.
§ The U. S. W. B. hourly record at Dayton was interrupted at 4:30 p. m., March 25, and hence the amount stated includes only to that hour.
1. The record as published in the U. S. Monthly Weather Review.
2. The record as published in U. S. Weather Bureau Bulletin Z.
3. A local record as furnished by H. F. Alps.
T. Denotes trace of precipitation.

RAINFALL CONTOUR MAPS

The following maps, Figs. 12 to 20, show the daily and cumulated rainfall for each day, March 23 to 27, 1913, as given in the preceding table, on the basis of the 7 p. m. readings. The amount of the precipitation is shown at each station. For the river stations where the rainfall is measured in the morning, requiring the evening readings to be estimated, the estimated amount is enclosed in brackets on the maps. On each map are drawn lines of equal rainfall or rainfall contours as they may be called.

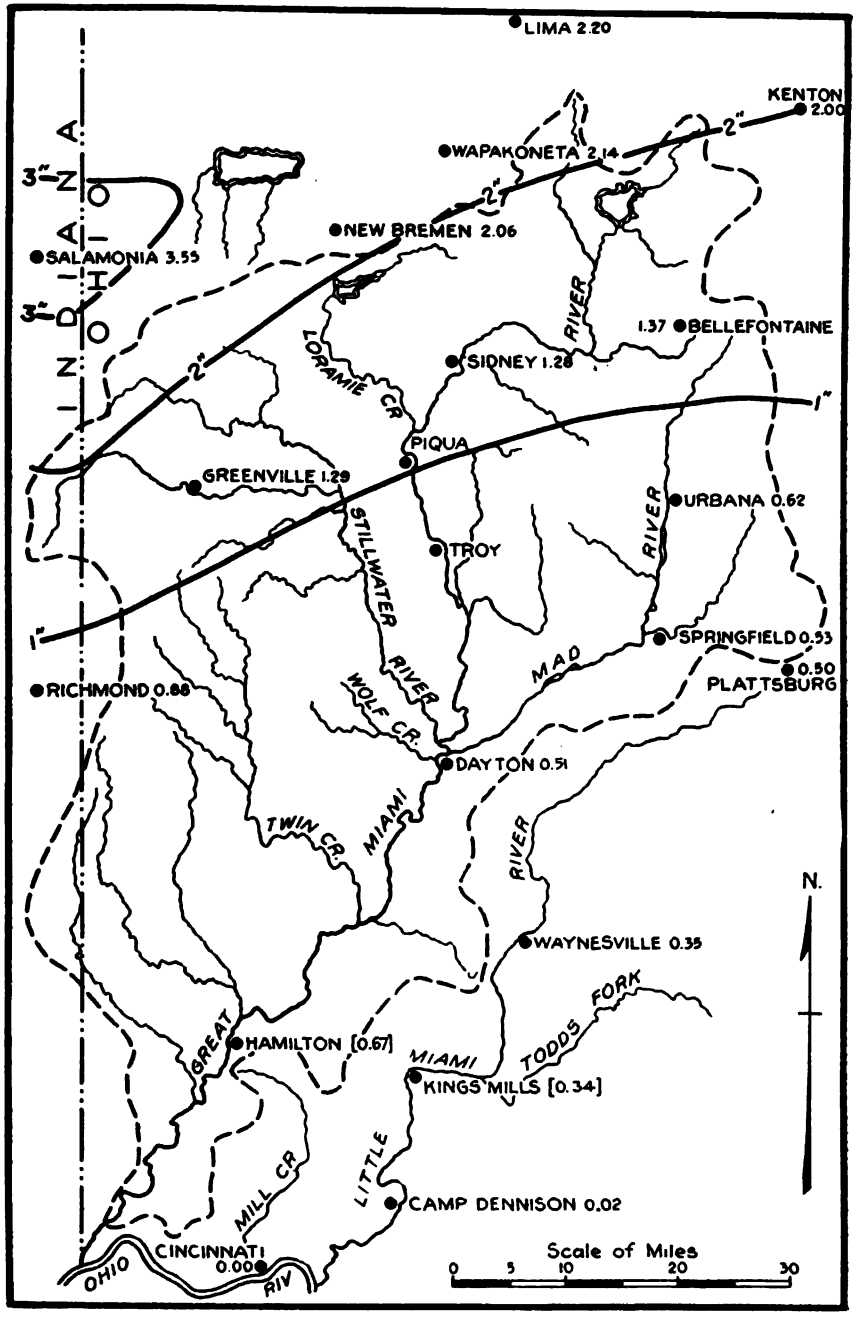


Fig. 12.—Rainfall map of Miami drainage area for March 23, 1913. Rainfall measured at observing stations is shown in inches.

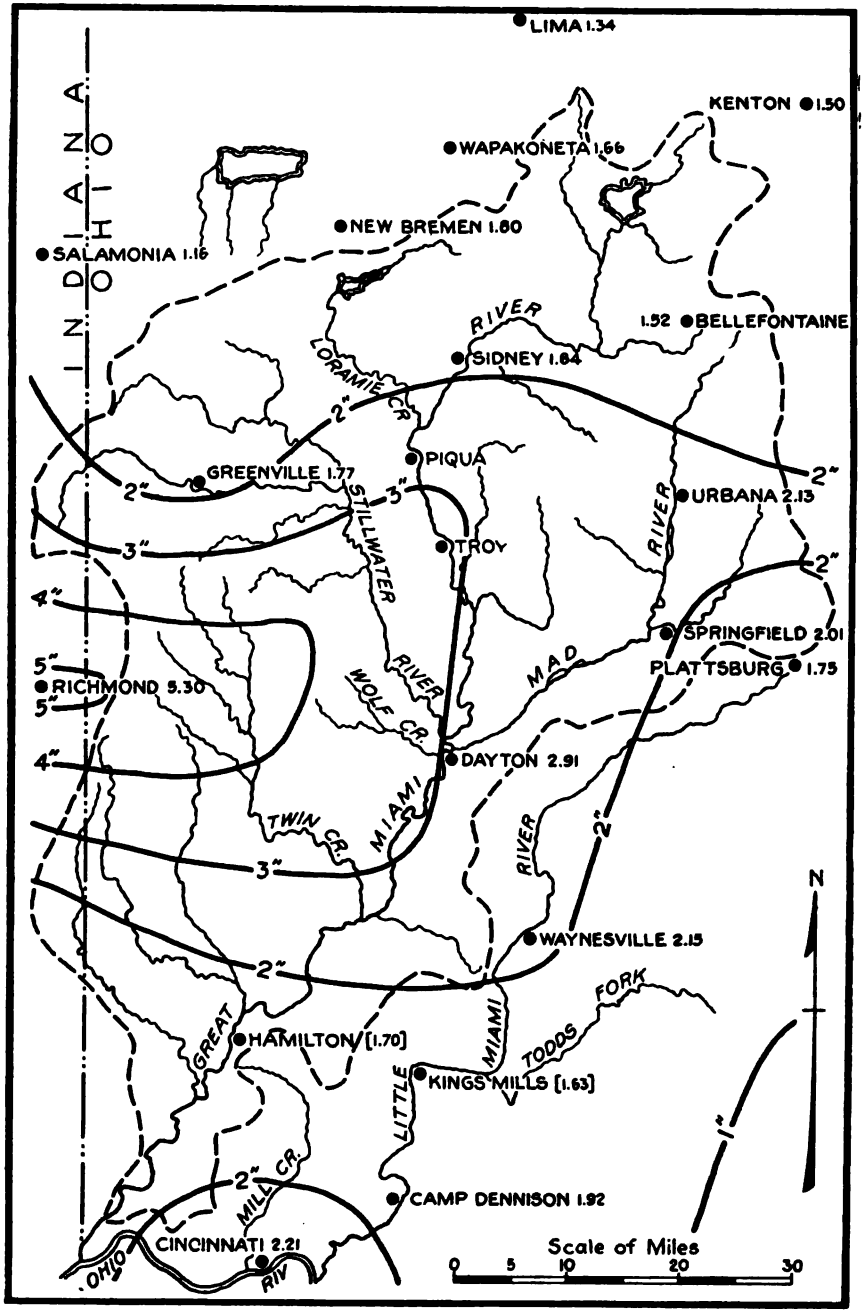


Fig. 13.—Rainfall map of Miami drainage area for March 24, 1913. Rainfall measured at observing stations is shown in inches.

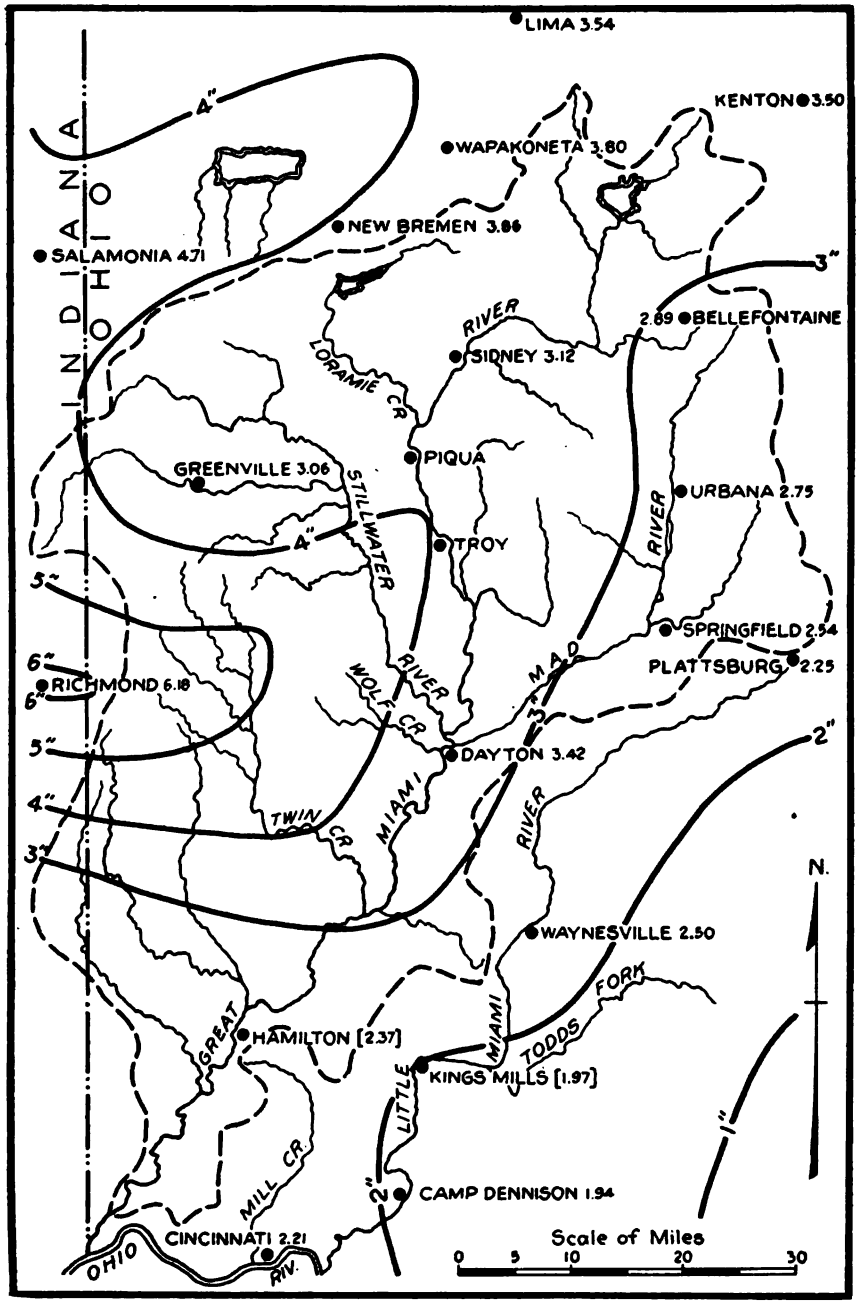


Fig. 14.—Cumulated Rainfall map of Miami drainage area for March 23-24, 1913. Rainfall measured at observing stations is shown in inches.

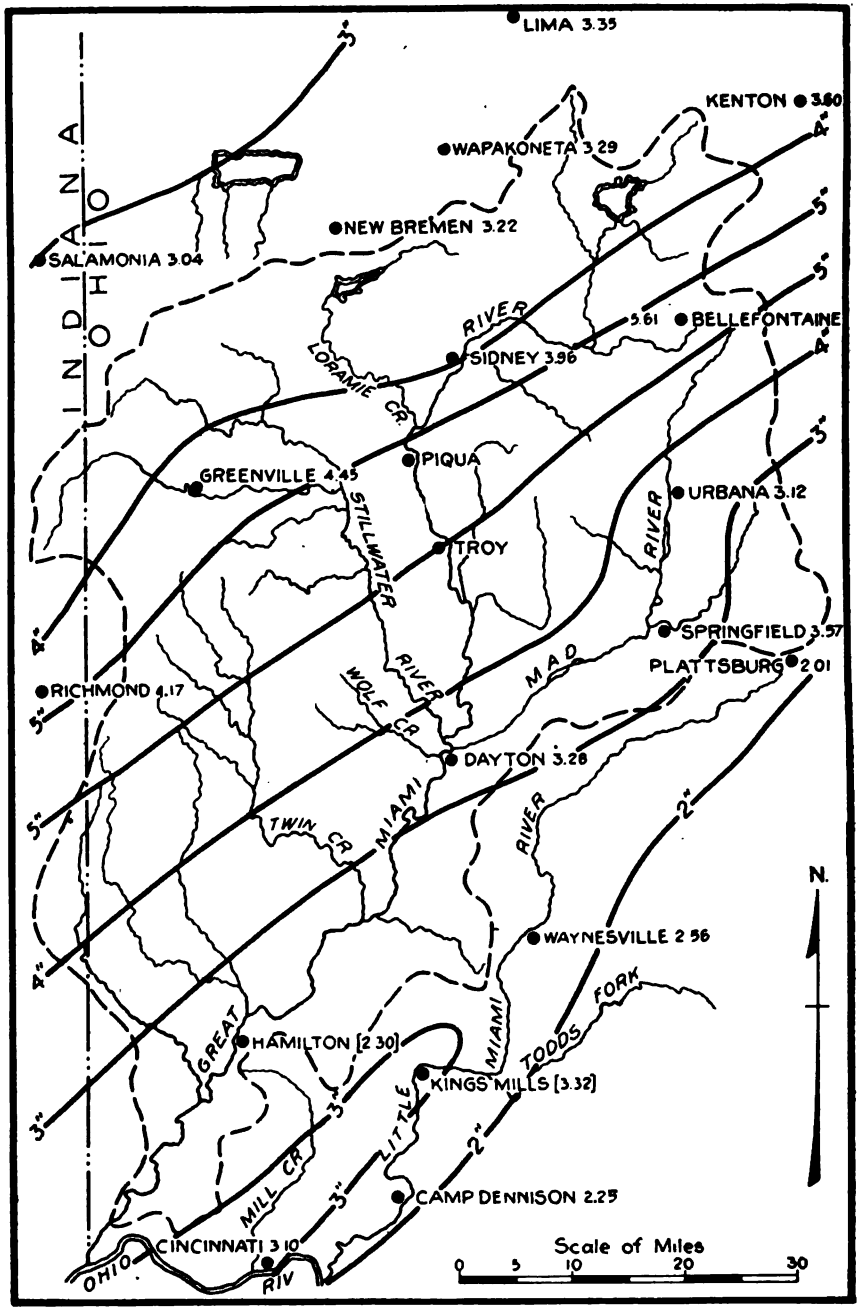


Fig. 15.—Rainfall map of Miami drainage area for March 25, 1913. Rainfall measured at observing stations is shown in inches.

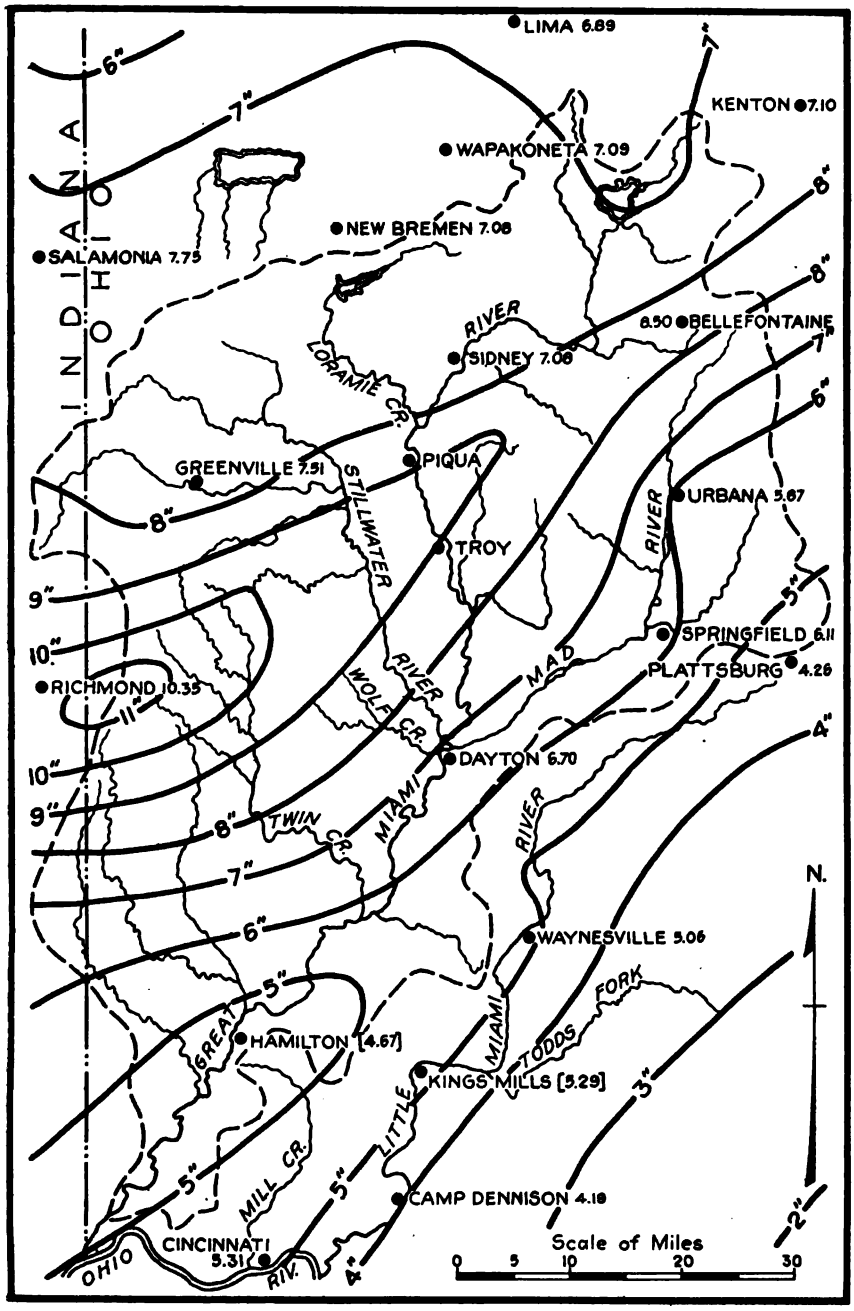


Fig. 16.—Cumulated Rainfall map of Miami drainage area for March 23-25, 1913. Rainfall measured at observing stations is shown in inches.

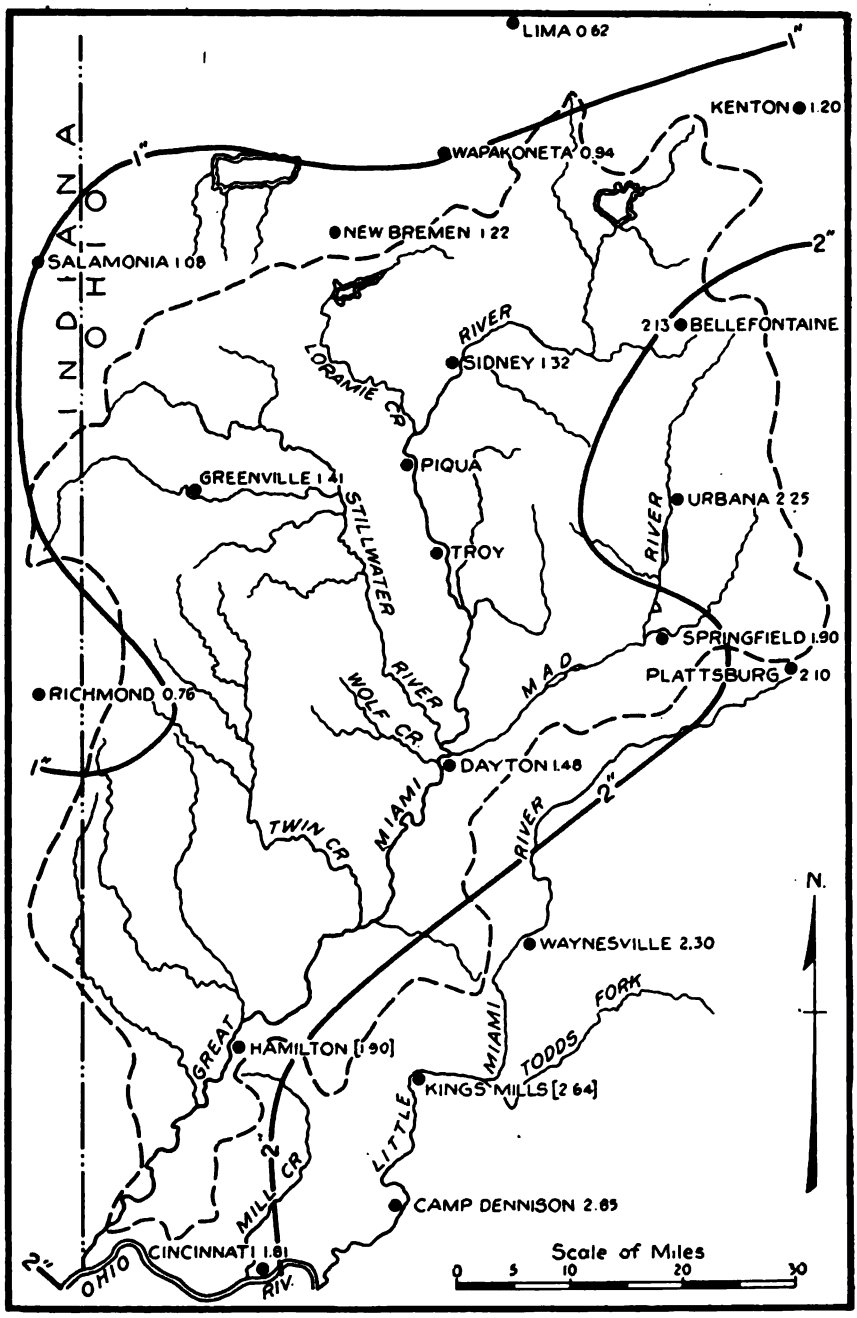


Fig. 17.—Rainfall map of Miami drainage area for March 26, 1913. Rainfall measured at observing stations is shown in inches.

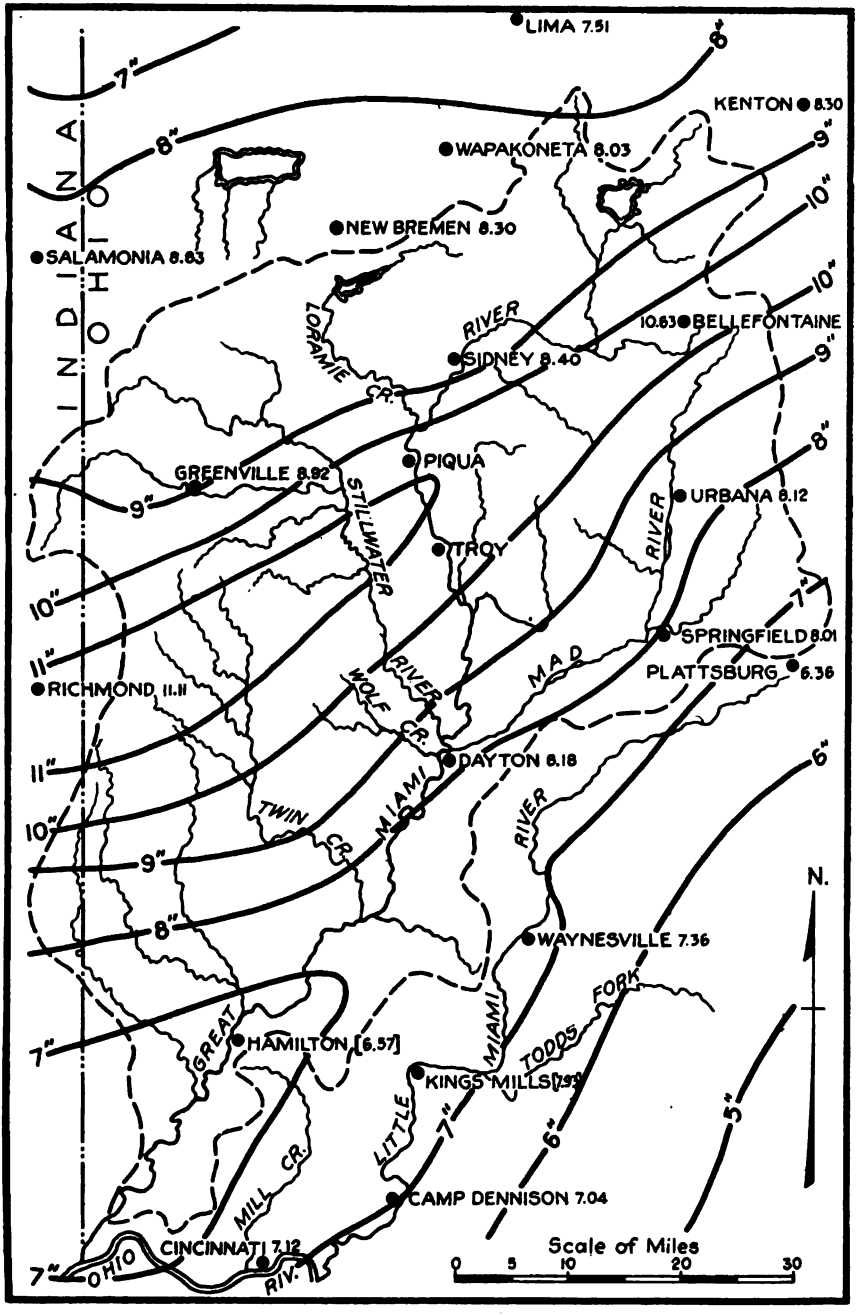


Fig. 18.—Cumulated Rainfall map of Miami drainage area for March 23-26, 1913. Rainfall measured at observing stations is shown in inches.

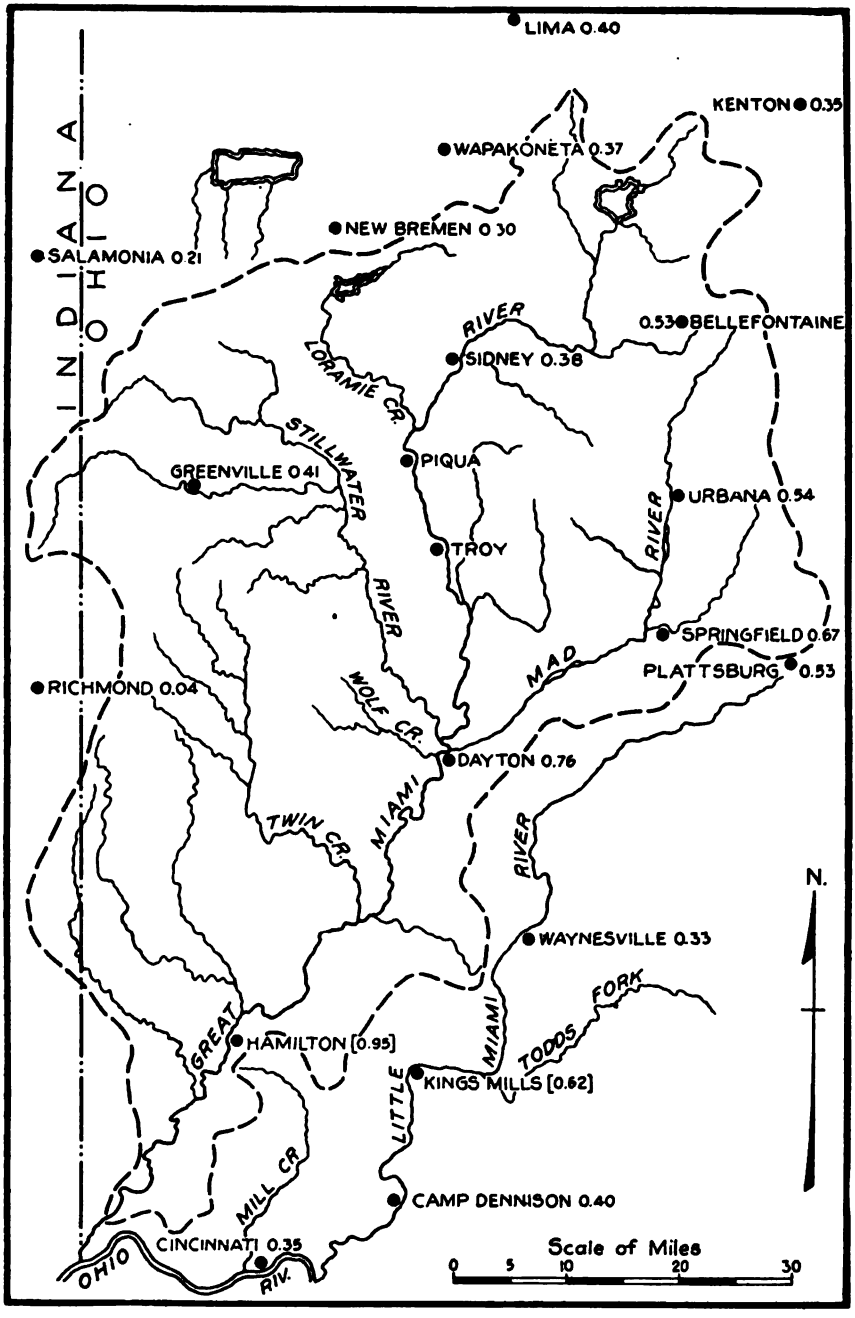


Fig. 19.—Rainfall map of Miami drainage area for March 27, 1913. Rainfall measured at observing stations is shown in inches.

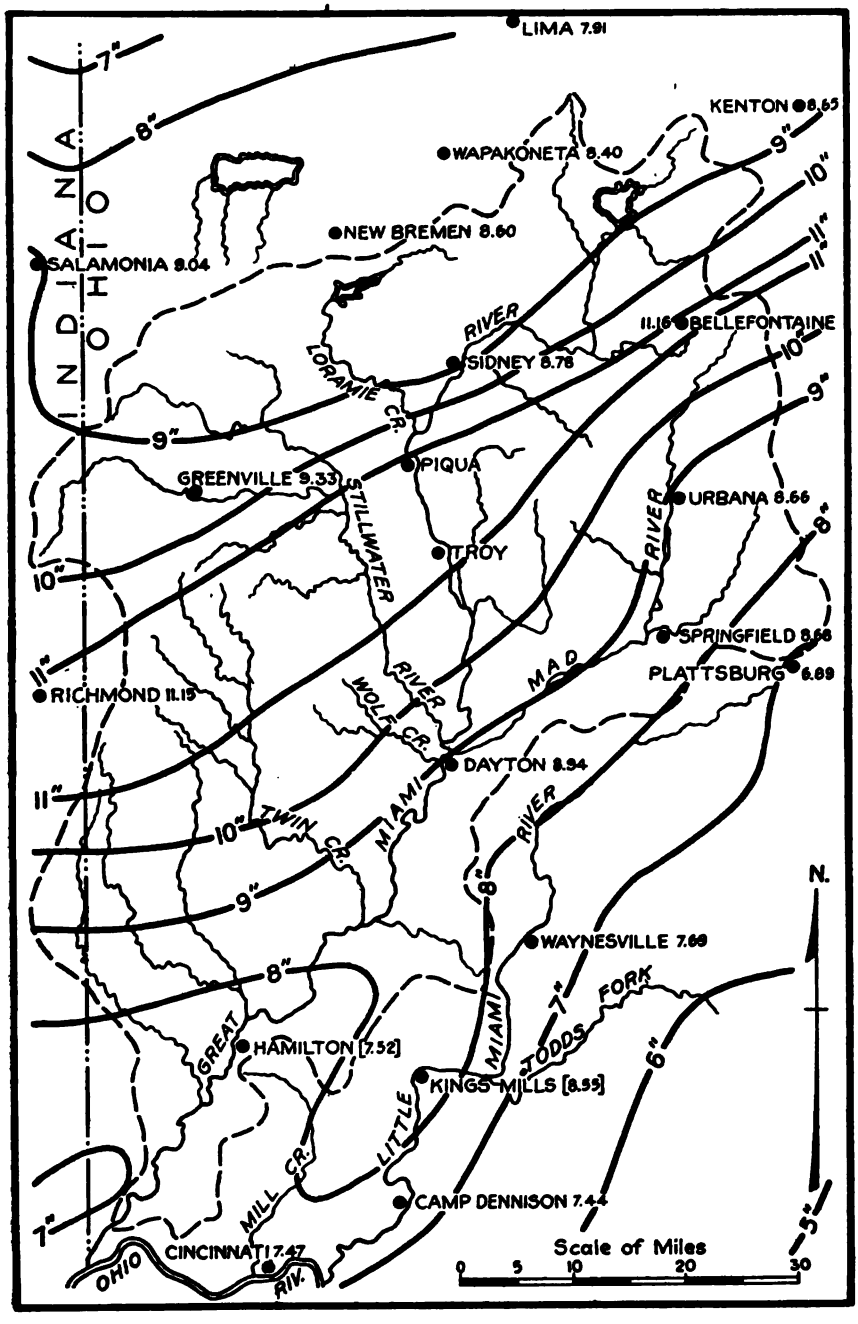


Fig. 20.—Cumulated Rainfall map of Miami drainage area for March 23-27, 1913. Rainfall measured at observing stations is shown in inches.

PREVIOUS FLOODS IN THE MIAMI VALLEY

The frequency and size of floods that have occurred in the Miami Valley during the last century can be illustrated by references found in the early histories of Dayton to the floods that have been experienced at that city, as records at Dayton cover a larger period than those of other cities in the valley.

1805 The Miami Valley was first settled at Dayton in 1796, and the first flood of record occurred in March, 1805. It was caused by the melting of deep snows and heavy rains on the headwaters of the Mad and Miami Rivers. The water rose rapidly, overflowed the banks at the head of Jefferson Street and just west of Wilkinson Street, covering nearly all the town plat, except a small portion bounded by Monument Avenue, Wilkinson, Perry, Third, and Main Streets. No levees had been built at this time, and ordinary freshets occupied the low ground east from the present location of the canal. The water was about eight feet deep at the corner of Third and Main Streets, where there was a gully at that time, which has since been filled. The present ground surface is from six to seven feet above its original elevation.

The direction and depth of flow has been so changed by the construction of buildings in the main part of Dayton and by the cutting of the forests in the river valley immediately above and below the city that it is not possible to tell whether the flood of 1805 represented a flow as great as or greater than that of 1913.

1814 The rivers again reached a dangerous stage in 1814 (no record of the month), and overflowed the low lands to the east of Main Street at the present intersection of First Street and Canal Street. A ferry was maintained for several days, the water being deep enough to swim a horse.

1828 On January 8, 1828, the rivers were in flood, breaking or passing around all the small levees that had been built up to that time. Considerable damage was caused, small bridges were carried away and a warehouse at the head of Wilkinson Street was destroyed.

1832 In February, 1832, another flood occurred as high as that of 1828. This flood washed out the middle pier of the Bridge Street bridge (now Dayton View bridge).

1847 The following is quoted from an account of the flood of January 2, 1847, published in Odell's Dayton Directory and Business Advertiser, dated 1850.

"A few minutes after midnight, (Jan. 1, 1847) the insignificant outer levee, that for years had been neglected and weakened by earth being hauled from it to fill up house yards and roads, gave way, near Bridge Street, and the inner levee being insufficient to withstand the torrent suddenly rushing upon it, and rising in a breast two feet above it, soon after fell in. A breach once made, the waters rose rapidly, filling the cellars and covering the ground floors of houses in the vicinity. . . . . The levee gave way near the head of Mill Street, about two o'clock (Jan. 2)."

The account states that comparatively little damage was done, and that no lives were lost. It is accompanied by a map of the city, showing the inundated area, from which it appears that nearly the entire section bounded by Water (now Monument), Wilkinson, Fifth and Jefferson Streets was not covered by water, the principal damage being done west of Perry and east of St. Clair Streets. The account closes with the following significant remark:

"A levee was soon after constructed, which will completely secure the lower parts of town from any such catastrophe for the future."

1866 Heavy rainstorms starting on September 17, 1866, and lasting for three days, caused a serious flood. The levee gave way east of town and water rushed through the lower parts of the city, backwater from the Miami through an old ditch aiding in flooding the southern part. It was recorded that the water was one foot deep on the floor of the Beckel House (Third and Jefferson) and four inches deep on the floor of the Phillips House (Third and Main). All railway communication was cut off, and the losses to public and private property were estimated at $250,000.00. After this flood, the river channel was widened by adding a span to the Third Street bridge and to the Bridge Street bridge. No records have been found of the rainfall of this storm, but the month's rainfall for Urbana, the only station then in existence on the drainage area, was the highest recorded in a forty-three year record, and the highest month's record found on the drainage area since, being 15.88 inches as against 10.53 inches for March, 1913.

The lower stage of water with the higher rainfall in 1866 as compared with 1913, was doubtless partly due to the fact that in 1866 the swamp lands on the upper watershed were not drained and constituted natural storage reservoirs, and also to the fact that the flood occurred at the end of summer, when the capacity of the soil to hold water naturally would be greatest, and when the runoff would be only half or two-thirds as much as would result from a like storm in March.

1883 There was a general flood in the Miami on February 3, 4, and 5, 1883, the danger being increased by the large amount of ice in the stream. The water did not quite reach the high water mark of 1847, and was two feet below that of 1866. Wolf Creek rose to an unprecedented height. The rivers did not overtop or burst their levees at any point in Dayton, but all of the low lying sections of town were flooded by water which entered through the flood gates of the canal, hydraulics, and sewers, which were frozen to their bearings and could not be shut. The water was twenty-two inches deep at the foot of Ludlow Street. After this flood, the levees were strengthened and extended.

1886 On May 12, 1886, a heavy rainfall, accompanied by a shower of hail, occurred generally over the drainage area, being especially heavy on Wolf Creek. The southern part of the city was troubled by the collection of storm water. The railway embankment across the Wolf Creek Valley finally gave way, washing a number of houses on the west side from their foundations and flooding a large part of that section. On Fifth Street from Wayne Avenue to Eagle Street, the water covered the streets and the sidewalks for nearly the whole distance. Between Wayne and Bainbridge and on Wayne from Fifth south to Burns, the water was about 2½ or 3 feet deep, and the territory bounded by Warren, Buckeye, Chestnut, Wayne, and Park Streets, was entirely submerged, deep enough in places to swim a horse.

1897 and 1898 On March 6, 1897, and again on March 23, 1898, there were severe floods. The Miami in both years broke into North Dayton at a sharp bend which has since been cut off, and flooded all the low ground in that section. Riverdale was flooded by backwater through the gates of the old hydraulic race which has since been removed. Storm water collected on the streets in the lower parts of the city, flooding a number of low spots to a depth of several feet. The level of the water in many places reached the top of the then existing levees which were raised about three feet during the next year.

PREVIOUS MAXIMUM GAGE HEIGHTS

Since December, 1892, the U. S. Weather Bureau has recorded daily gage heights of the Miami River at Dayton. From this data a list has been compiled containing all the floods which have reached or exceeded a gage height of 11 feet, during the period from Jan. 1, 1893 to Dec. 31, 1915. Table 7 shows the maximum stages reached; it contains also the heights reached during the floods of 1866 and 1883, based upon the fragmentary records which are available for floods preceding 1893.

Of the twenty-nine floods here recorded, all except five occurred in the winter or early spring, and all except seven of them occurred between the first of January and the end of March.

Table 7.—Maximum River Stages of 11 Feet and Above at Dayton, Ohio. Based on Daily Readings of U. S. Weather Bureau and Fragmentary Early Records. Zero of the River Gage is 723.73 Feet Above Mean Sea Level

Year	Dates of Occurrence												Maximum gage height Feet
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1866									19				21.3
1883		5											19.0
1893					2								15.8
1897			6										16.3
1898			23										19.7
1903			1										11.8
1904	22												12.5
1904			27										14.8
1904				2									11.2
1905					12								11.0
1906			27										13.2
1907	5												13.8
1907	20												12.5
1907			14										15.2
1908		15											16.1
1908			2										14.3
1908			6										14.4
1908			19										11.0
1909		25											13.8
1910	18												12.6
1910		28											15.7
1910										7			16.1
1912		27											14.5
1912			15										11.2
1912			30										14.2
1913	8												11.0
1913			25										29.0
1913				4									11.6
1915							9						11.3

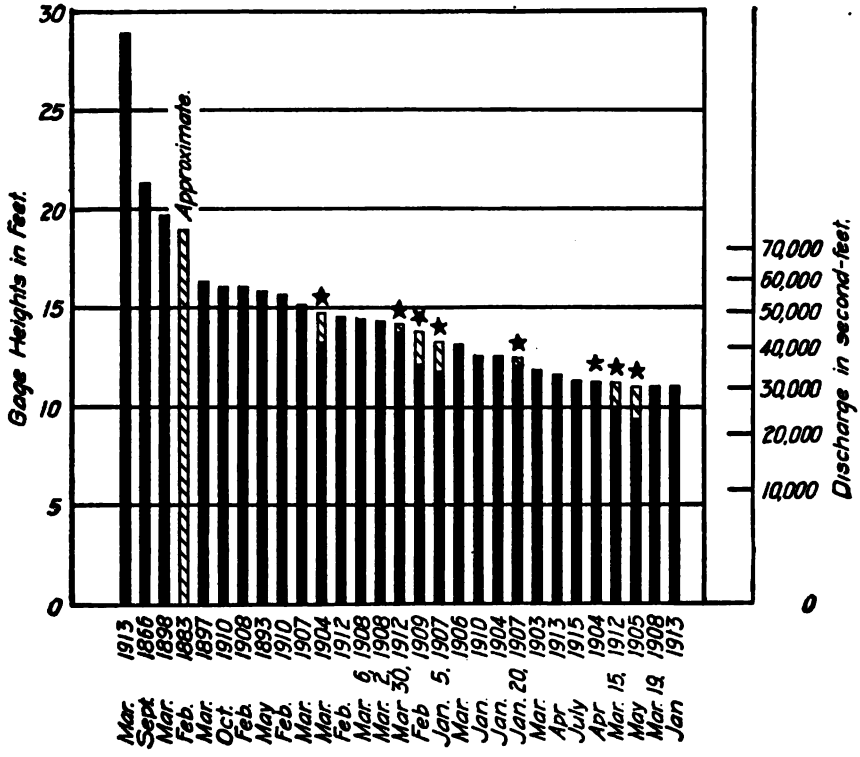


Fig. 21.—Maximum Miami River Stages of 11 feet and above, at Dayton, Ohio. Based upon daily gage readings of U. S. Weather Bureau from Dec. 22, 1892, to Jan. 1, 1916, and fragmentary early records. Crest stages marked with star are estimated from hydrographs.

Figure 21 shows the maximum gage heights reached at Dayton during the floods listed in Table 7. These floods are arranged on the diagram in the order of their magnitude. An additional marginal scale shows the discharge in second feet corresponding to the various gage heights.

Floods for which the gage heights are based on accurate data are represented by black-faced columns. The shaded columns are used where only approximate data is available.

It is interesting to note that of the twenty-four largest floods in 23 years, twenty occurred in the last half and only four in the first half of that period.

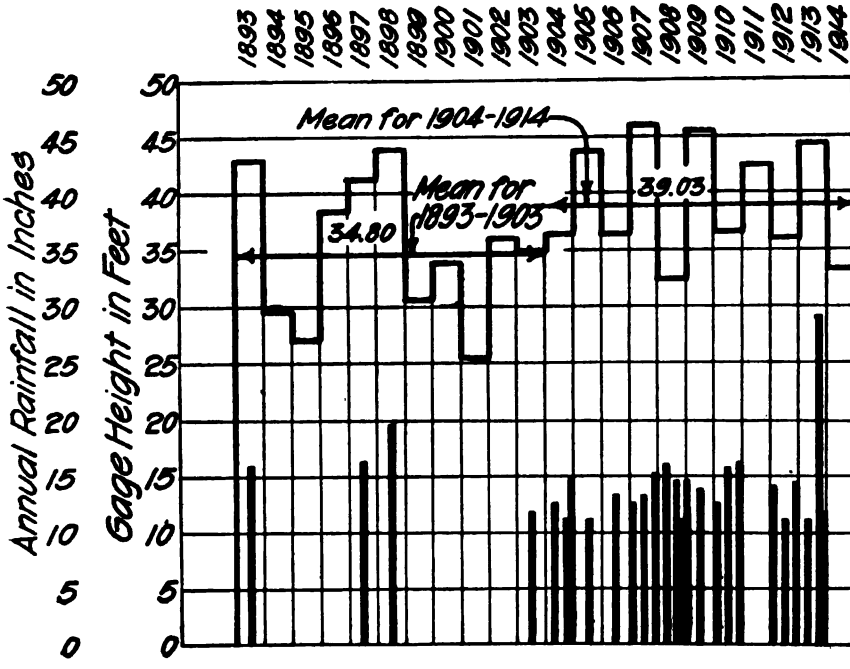


Fig. 22.—Mean Annual Rainfall in the Miami Valley and Maximum Flood Stages at Dayton, Ohio, for all floods reaching a gage height of 11 feet or more, during the years 1893 to 1914. Based on the records of the U. S. Weather Bureau.

Figure 22 shows the mean annual rainfall in the Miami Valley and the maximum flood stages at Dayton for all floods of 30,000 second feet or larger which have occurred during the years 1893 to 1914. This diagram shows that, during the 22-year period covered by these records, floods occurred in the 4 years of greatest annual rainfall, but that no flood occurred in any of the 6 years having the least annual rainfall. Other relations suggest themselves, but the record covers too short a time to afford a reliable basis for more categorical conclusions.

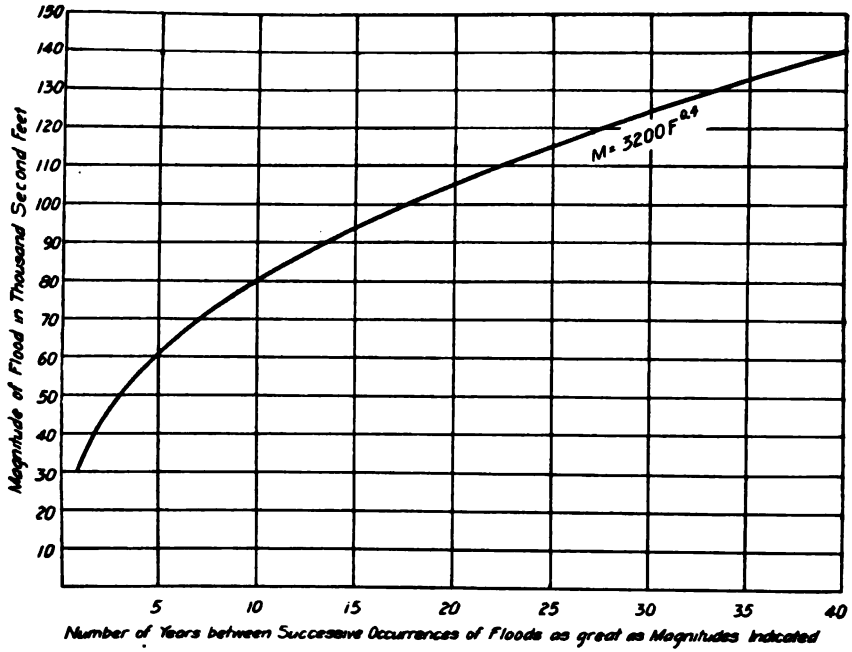


Fig. 23.—Curve showing Frequency of Floods at Dayton, Ohio. Based on the records shown in Fig. 21. The horizontal scale shows the probable average number of years which will elapse between successive occurrences of floods equalling or exceeding any given size as shown on the vertical scale.

FREQUENCY OF FLOODS

The curve in Fig. 23 indicates the Frequency of Floods in Dayton during recent years as derived from the preceding table and diagram. To learn the frequency of occurrence at Dayton of a flood of any particular amount, it is only necessary to find the size of the flood in the scale on the left-hand margin of the diagram, pass from this point horizontally to the curve, and then the point immediately below on the scale along the bottom of the diagram will show the average number of years that intervene between successive recurrences of a flood equal to or larger than the particular size under consideration.

DRAINAGE AREAS IN THE MIAMI VALLEY

Preliminary estimates of the drainage areas of the various streams in the Great Miami River Valley were made from a watershed map of the State of Ohio, prepared on a scale of 1 inch equals 4 miles, under the direction of Allen Hazen, for the Ohio State Board of Health. The estimates made on this basis agreed very well with the estimates given by other engineers who have made reports on engineering projects in this valley. For final estimates, however, it was deemed advisable to make a thorough check of these areas.

For the smaller areas, where U. S. Geological Survey topographic quadrangles covering them were available, the areas on these sheets were measured with a planimeter. Since the watershed is only partly covered by these maps, however, a map of the entire State, on a scale of 1:500,000, or about eight miles to the inch, prepared by the U. S. Geological Survey in 1910 and 1911, was used in a similar manner in determining the areas of the larger watersheds and the areas of the smaller ones which were not covered by the quadrangles.

According to information furnished by the U. S. Geological Survey, October 13, 1914, this state map was compiled directly from their primary traverse and their standard topographic maps, wherever such maps had been completed.

The U. S. Geological Survey further states that where topographic sheets have been subsequently completed "there proved to be surprisingly little difference between the original compilation and the reduction of the new topographic sheets."

Under date of October 15, 1914, A. H. Horton, district engineer of the Water Resources Branch of the U. S. Geological Survey, writes as follows:

"We have found that the 1:500,000 scale maps give very accurate results as compared with drainage areas obtained from topographic sheets. Areas obtained from topographic sheets are considered to be as nearly correct as it is possible to obtain drainage areas. The drainage area of the Kanawha River as determined from the large-scale State maps and from the topographic sheets check exactly to a square mile by independent measurements by different persons at different times. The drainage area of the Tennessee River at Chattanooga by the topographic sheets and by the large-scale State map check within 0.2 per cent. We consider the drainage areas as determined from the 1:500,000 State maps for areas of 1,000 square miles or more to be as accurate as those ob-

tained from topographic sheets. For smaller areas I would advise the use of topographic sheets whenever possible."

The engineers of the District computed the areas of certain tracts and compared the results with the areas obtained by measuring the same tracts on the different maps with a rolling planimeter. The results obtained are as follows:

U. S. G. S. Quadrangles

Area of Dayton Quadrangle by computations 229.2 square miles
" " " " " planimeter 229.9 square miles

U. S. G. S. State Map

Area bounded by Latitudes 39° and 40° and Longitudes 83° and 84°
By computations 3686.3 square miles
By planimeter 3685.2 square miles

In computing areas, lengths of arcs of latitude and longitudes were taken for the proper latitude from the tables in Johnson's or Tracy's Plane Surveying.

Table 8 shows the final values for the various drainage areas.

These later results differ from the earlier estimates in some cases as much as 6 per cent for watersheds of over 600 square miles; and, for such large areas, the later results are invariably the larger. In fact, only a few of the smaller areas were found to be less than indicated by the preliminary estimates.

Table 8.—Drainage Areas in the Miami Valley

* Indicates areas measured on U. S. G. S. Quadrangles.
All other areas measured on U. S. G. S. State Maps.

MIAMI RIVER

	Square miles
Above Lewistown Reservoir	*100
Above Tawawa Creek	499
At Sidney	555
Above Mill Branch	575
At Piqua	842
At Troy	908
At Tadmor	1,128
At Taylorsville Damsite	1,133
Above Stillwater River	1,162
At Dayton, above Wolf Creek	2,525
At Dayton, including Wolf Creek	2,598
Big Four Crossing below Miamisburg	2,722
Above Twin Creek	2,797
At South Line of Middletown	3,162
Above Four Mile Creek	3,330
At South Line of Hamilton	3,672
About 2 Miles below Miamitown	3,937
At Mouth	5,433

Table 8.—Drainage Areas—(Continued)

STILLWATER RIVER

	Square miles
Above Greenville Creek at Covington	223
At Sugar Grove	448
At West Milton	611
At Englewood Damsite	651
At Little York	657
At Mouth	674

MAD RIVER

Above Buck Creek	324
Above Mill Creek	488
Above Big Four R. R. Bridge No. 122	505
About 2 Miles below Osborn	649
At Huffman Damsite	671
At Mouth	689

MIAMI RIVER TRIBUTARIES

Tawawa Creek at Mouth	56
Loramie Creek above Mouth of Turtle Creek	*208
" " at Damsite	*255
" " at Mouth	*262
Turtle Creek at Mouth	*36
Spring Creek at Mouth	*27
Lost Creek at Mouth	58
Honey Creek at Mouth	89
Wolf Creek at Mouth	*73
Twin Creek at Damsite	*270
" " at Mouth	*313
Four Mile Creek above Seven Mile Creek	180
" " " at Mouth	322
Above Loramie Reservoir	*81

STILLWATER RIVER TRIBUTARIES

Greenville Creek at Mouth	219
Ludlow Creek at Mouth	*66

MAD RIVER TRIBUTARIES

Buck Creek at Mouth	164
Mill Creek at Mouth	*17
Donnells Creek at Mouth	29

VALLEY STORAGE ABOVE HAMILTON DURING THE 1913 FLOOD

Statements have been made to the effect that the amount of water flowing in the Miami Valley at one time during the 1913 flood greatly exceeded the capacity of the proposed retarding basins. In order to ascertain the facts a careful determination was made of the amount of water which lay in the Miami Valley from its headwaters to Hamilton during the highest flood stage. It was assumed that the flood reached the high water mark in all parts of the valley at the same instant. This, of course, is an extreme assumption, and implies a greater amount of water in the valley than actually was the case at any one time during the 1913 flood.

The results of this investigation indicate that the proposed retarding basins are large enough to hold 1½ times as much water as was in the valley above Hamilton at the extreme flood stage in 1913. In regard to relative areas flooded, the results show that the area within the boundaries of the proposed retarding basins that was actually flooded in 1913 is about 2/3 of the area that (after this construction) would be flooded within the basins by a flood of the same magnitude, and that this latter area is less than half the total area above Hamilton that was actually flooded in 1913.

The data used were the topographic sheets, scale 1 inch to 500 feet, the river detail sheets of the same scale, and the topographic sheets of Dayton, scale 1 inch to 200 feet, all prepared by the Morgan Engineering Company from their topographic surveys.

Within Dayton and the retarding basins the volume of water stored was determined from horizontal sections of the water prism measured at the contour intervals given on the map. These sections are bounded by the submerged contour line of the ground, closed by a straight line crossing the water surface. The same procedure was used in finding the quantity of water in the river valley except at places where the contour maps had not been finished. At these places, two methods were used. The quantity was found, where the flood boundary was mapped, by measuring the flooded area in small parts and multiplying the area of each part by the mean depth of the water, estimated from inspection of all elevations given on the map. Where the flooded boundary had not been mapped the quantities were found by plotting parallel and equally spaced valley cross sections upon which were shown the maximum water level. The volumes were calculated from these cross sections.

Where possible the flooded area was planimetered from its boundary line marked on the maps. Where the high water boundary was not drawn, on some of the detail river sheets, this area was obtained by multiplying the lengths of the cross sections mentioned above for channel widths, by their distance apart as lengths. The calculated volumes and areas include the river channel proper.

Table 9 shows the amount of water actually stored in the main valleys, at the height of the flood in March, 1913, as calculated, and Table 10 shows similarly the areas submerged. Table 11 shows the areas in the basins that will be submerged after they are built during the occurrence of a flood as large as that of March, 1913, together with the volumes of water that would be temporarily stored; and also gives the areas and capacities of the basins up to the spillway levels.

Table 9.—Amount of Water Actually Stored in Valley Above Hamilton During 1913 Flood

	Acre feet
Twin Creek Valley	34,810
Stillwater Valley, Covington to Dayton	57,010
Miami Valley to Dayton	119,730
Mad River Valley	40,250
Dayton (Area covered by 200-foot scale topographic sheets)	83,700
Miami Valley, Dayton to Hamilton	232,440
Upper end of basins to Hamilton	567,900

Table 10.—Area Above Hamilton Actually Flooded by 1913 Flood

A. Area flooded in Valleys within Basin boundaries, in acres.

	1913 Stage	Spillway
Germantown Basin	2,045	2,150
Englewood "	3,285	3,505
Lockington "	3,240	3,550
Taylorsville "	6,700	7,450
Huffman "	3,420	3,890
Total	18,690	20,545

Table 10.—Area Above Hamilton Flooded by 1913 Flood—(Continued)

B. Area flooded in Valleys from extreme upper end of various Basins to Hamilton

	Acres
Twin Creek Valley	4,290
Stillwater Valley, Covington to Dayton	5,250
Mad River Valley	7,095
Miami Valley to Dayton	17,400
Dayton (Area covered by 200-foot scale topographic sheets)	7,510
Miami Valley, Dayton to Hamilton	21,315
Upper end of basins to Hamilton	62,860

Table 11.—Area Flooded and Storage Capacity in Basins When They Shall Have Been Built

Basin	1913 Stage			At Spillway		
	Elev.	Area	Capacity	Elev.	Area	Capacity
	Feet	Acres	Acre feet	Feet	Acres	Acre feet
Germantown	805	2,950	73,000	815	3,520	106,000
Englewood	862	6,350	209,000	876	7,930	312,000
Lockington	936	3,600	63,000	938	4,020	70,000
Taylorsville	815	9,650	152,000	818	11,000	186,000
Huffman	830	7,300	124,000	835	9,180	167,000
Totals		29,850	621,000		35,650	841,000

1913 Stage

$$\frac{\text{Submerged Area in Basins, 1913 actual}}{\text{Submerged Area in Basins, when built}} = \frac{18,690}{29,850} = 62.6 \text{ per cent}$$

$$\frac{\text{Submerged Area in Basins, when built}}{\text{Total flooded Area above Hamilton}} = \frac{29,850}{62,860} = 47.5 \text{ per cent}$$

$$\frac{\text{Water stored in Basins, when built}}{\text{Total water stored in Valley above Hamilton}} = \frac{621,000}{567,900} = 109 \text{ per cent}$$

At Spillways (Maximum Storm Condition)

$$\frac{\text{Area of Basins, to Spillways}}{\text{Total Area, above Hamilton, flooded in 1913}} = \frac{35,650}{62,860} = 56.7 \text{ per cent}$$

$$\frac{\text{Water stored in Basins, to Spillways}}{\text{Total water stored in Valley, above Hamilton, in 1913}} = \frac{841,000}{567,900} = 148 \text{ per cent}$$

MEASUREMENT OF THE MAXIMUM RATE OF FLOW DURING THE 1913 FLOOD

It was very essential in making plans for flood prevention to determine as closely as possible the amount of rain which fell and the amount of water which passed off during the flood. So far as can be learned no actual measurements were made, at the time, of the discharge of the Great Miami River during the flood of March 22-27, 1913. Immediately following the flood, however, several engineers made estimates of the maximum rate of flow. Those made for the maximum rate at Dayton varied from 100,000 to 300,000 second feet. Some of these were based on the relation between rainfall and runoff; others, on valley cross sections and slope, but none could be considered reliable.

With the beginning of a flood protection survey, the need of accurate runoff determination was at once apparent. No matter what form of protective plans should be decided upon, whether retarding basins, channel improvement, or both, intelligent conclusions could not be reached without a definite knowledge of the quantity of water to be provided for. This knowledge could best be obtained through information concerning past floods, especially that of 1913.

The determination of the maximum rate of flow during the flood of March, 1913, on the various streams of the Miami Valley was made by the engineers of the Morgan Engineering Co., during the summer of 1913, from two to eight months subsequent to the flood, and was based upon the high water marks which were visible everywhere throughout the valley. Two general methods were used, the first resting upon measurements of the cross section and slope of the flooded valleys and using accepted methods of computing the discharge from these elements, the second resting upon the amount of the sudden drop of the water surface in passing through a constricted opening at locations where some obstruction produced a considerable contraction in the cross section of the moving flood stream.

Good opportunities for careful determinations of flood flow were available not only on the main streams but also on the majority of the smaller tributaries. Numerous definite valley sections comparatively regular and free from bends, well suited for slope-area determinations, were found, as well as several contracted openings such as would produce definite increase in head and velocity, suit-

able for giving satisfactory checks on the discharge computed by the less precise stream flow formulas.

A hydraulic investigation party was organized to make detailed hydrographic surveys of the best and most important locations. This party moved from point to point, working out each location separately, their individual surveys being tied in later to the general topographic survey.

Survey for Determining Runoff

In collecting the data for the slope-area calculations, highwater lines were run along the edges of the valley and the banks of the river; and typical cross sections 300 to 800 feet apart, depending upon the conditions at the particular location, were taken at right angles to the direction of the flow. All available highwater marks were secured. Notes were taken concerning margins, thickness, and character, of timber; conditions of the bottom of the valley and river, fences, levees, buildings, railroads, public roads and any other natural or artificial conditions that might affect the flow of the stream. Besides noting these various features, probable values of roughness factor "n" in Kutter's formula were recorded for the overflow areas and main channel of each cross section. Until passed upon and corrected in the final calculations, these represented merely the opinion of the assistant chief of party who had carefully observed and compared the conditions at the various locations. Before the final computations were made the values of the factor "n" were revised by Mr. Morgan and Mr. Woodward from their experience in the use of Kutter's formula. Careful effort was made to base the value of the factor "n" upon the actual conditions as noted on the ground, entirely independent of the consistency of the results obtained.

The surveys at the contracted openings consisted, for the most part, of detailed soundings and determinations of flood surface. Reliable highwater marks in sufficient number to determine the average slope above the drop-off, the drop-off curve itself, the lowest part of the trough, the standing wave, and the get-away slope, were secured. Soundings were taken along sections between upstream and downstream edges of abutments, along lines just above and just below the openings, and at enough points to locate the maximum scour, edges of holes, and general bottom of the river. Where surveys for slope-area calculations had not been made in the valley just above the contraction, a typical valley cross section for use in estimating velocity of approach was secured. Notes were recorded

concerning the nature of the bottom, the condition of abutments, conditions above and below the opening, and any other features that might affect the flow.

Points were located by stadia methods. Compass bearings were recorded where there was nothing to affect the movement of the needle. Where such records might be in error, azimuth methods were used. Elevations were determined by leveling. Turning-points, heights of instrument, bench marks, and definite high water marks, such as would be found on the inside of buildings, were determined to hundredths of a foot. Ground surfaces, soundings, and ordinary high water marks, such as would be found on trees, were determined to tenths of a foot. Distances were read to the nearest foot where possible. Readings with the level were not taken at distances greater than 500 feet.

Computation Methods

In computing quantities from the slope-area measurements, Kutter's formula was used as a basis. Various other formulas were tried, but were found to give results no more satisfactory when compared with the bridge opening results. At Tadmor, Ohio, for instance, where definite slope-area and contracted opening surveys were both obtained, Kutter's formula using a roughness factor of 0.035 gave 125,000 second feet; Bazin's formula, using a roughness factor of 1.75, gave 140,000 second feet; while the bridge opening method, which will be explained in detail later, gave 132,000 second feet. If, in the computations by the last method the theoretical velocity due to the total head (drop in water-surface plus head due to the velocity of approach) had been taken without making any deductions whatever for contraction and friction loss a maximum possible result of only 144,000 second feet would have been obtained.

The individual cross sections were divided into parts, separating the main channel from the overflow areas, as shown in the accompanying cross sections of the Tadmor survey, Fig. 24. Each part was then treated as a separate channel, and its discharge computed accordingly. The various results were then totaled to give the discharge of the entire cross section. The parts covered with trees were omitted, although evidences existed of some flow through them. Where there were trees on the dividing lines between the respective parts of the channels, the vertical distances at the margins of the trees were included in the wetted perimeters. Areas of cross sections were measured with a planimeter.

Values of roughness factor "n" were estimated for each part of each cross section after carefully considering all the conditions at the particular location and comparing them with those at the other points studied. The values used are believed to be consistent throughout. The entire system may be somewhat high or somewhat low, but the values used were selected by comparison with values known to be satisfactory in similar locations elsewhere with which the engineers are familiar.

The first step in calculating the discharge through the contracted openings was the determination of the velocity head. The discharge was then obtained by multiplying together the velocity corresponding to this head and the net area at the point of maximum contraction. The determination of the velocity head involved three steps; first, the determination of the velocity of approach; second, the determination of the total drop in the water surface; and third, the determination of the friction loss in the section in which the necessary increase in velocity was acquired. The velocity of approach was obtained from slope-area measurements above the opening; from the measured slope of approach, using Kutter's formula; or by dividing an estimated quantity by the area of the flood cross section just above the drop-off. If determined by the last named method, successive approximations were made until the estimated flow above equalled that at the opening. The velocity of approach being a minor factor, this method did not lead to appreciable error. The total drop in the water surface was taken from the high water elevations secured above and below the contraction. The elevation above the opening was taken at the point where the drop-off curve began, while the elevation below was taken at the bottom of the trough where maximum contraction existed.

The friction loss was estimated by the following method of successive approximation. A certain value was assumed and subtracted from the total head (drop-off plus head due to velocity of approach), thus giving an assumed velocity head. The square of the velocity corresponding to this head was then averaged with the square of the velocity of approach to obtain the square of the average velocity in the section under discussion. It was believed that this method would give a value nearer correct than would be obtained by a simple average of the two velocities themselves. The friction loss was then computed by multiplying together the length of the section in which the additional velocity was acquired, the surface slope above the drop-off, and the ratio of the square of the average velocity to the square of the velocity of approach, thus using

the principle that the head used up in friction varies as the squares of the velocity. If the result came within a few hundredths of the value previously assumed, it was considered correct.

The net area was determined by the cross sections taken along the downstream edge of the opening, the surface elevation being taken equal to the average of the lowest elevations. If the alignment was at an angle with the direction of flow, proper reduction was made. Contraction coefficients were applied whenever the existence of piers, shape of abutments, or conditions in general seemed to indicate the advisability of such procedure.

As a general rule, computations were carried to three significant figures. However, values of "c" in the Chezy formula were not taken closer than the nearest unit, and values of hydraulic radii were not taken closer than the nearest tenth of a foot.

Typical Example

The explanation of methods can probably be made clearer by giving in detail one of the measurements that involved both slope-area and contracted opening computations. Typical of such are the Tadmor calculations. The general topographic and hydrographic conditions may be seen by referring to the accompanying plat, profiles, and cross sections, Figs. 24 and 25. The valley above Tadmor, where four of the cross sections were taken, is very regular, free from obstructions, and well suited for an estimate by the Chezy formula. But few trees line the east bank of the river; the flood lines are comparatively regular; the bottom of the valley is free from any great ridges or depressions; and the river channel is free from bars, rapids, or holes. The river crosses from the east to the west edge of the valley at the upper end of the survey, follows the west edge to a point below Tadmor, then crosses again to the east edge and follows the east edge beyond the limits of the survey. The valley below Tadmor is not quite so regular as it is above. The flood lines are slightly more irregular; the bottom of the valley slightly rougher; and the trees considerably thicker.

About two miles below Tadmor, the Miami & Erie Canal which follows the east side of the C. H. & D. R. R. from the upper limits of the survey to this point, crosses the valley and river, being carried across the valley on a high fill and across the river on a through truss bridge of three spans. The total distance between abutments is 280 feet, while the width of the valley just above is approximately a half mile. The water did not overtop this fill. The entire quan-

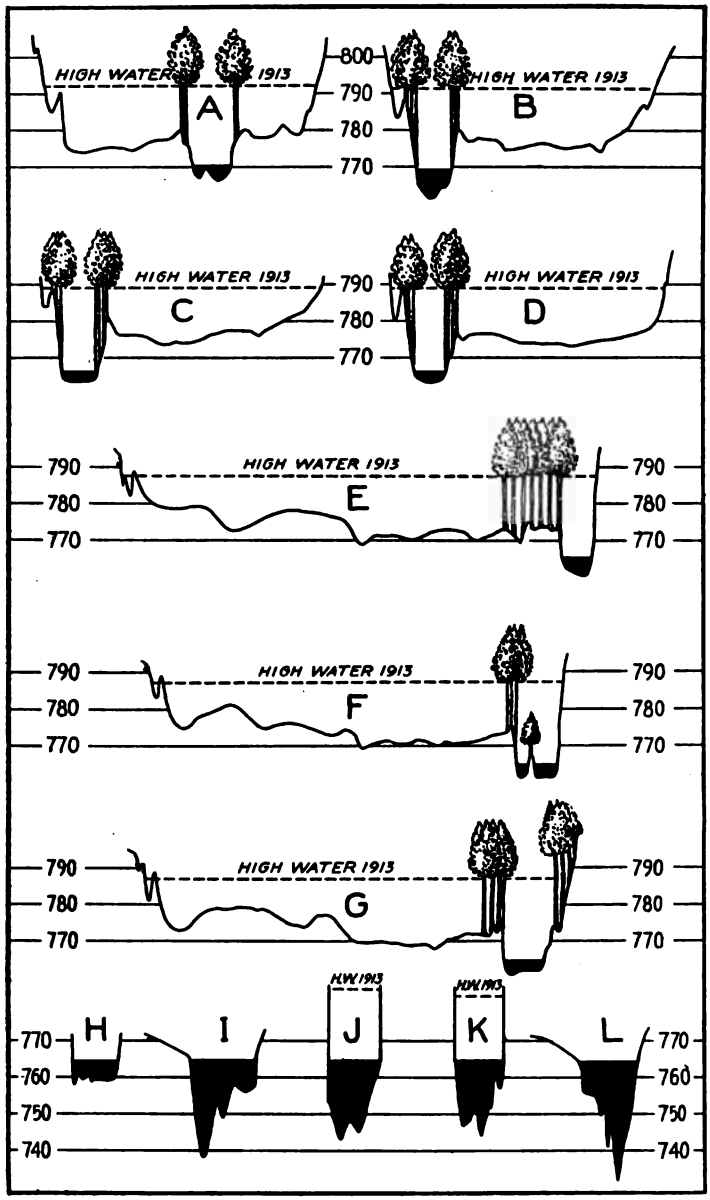
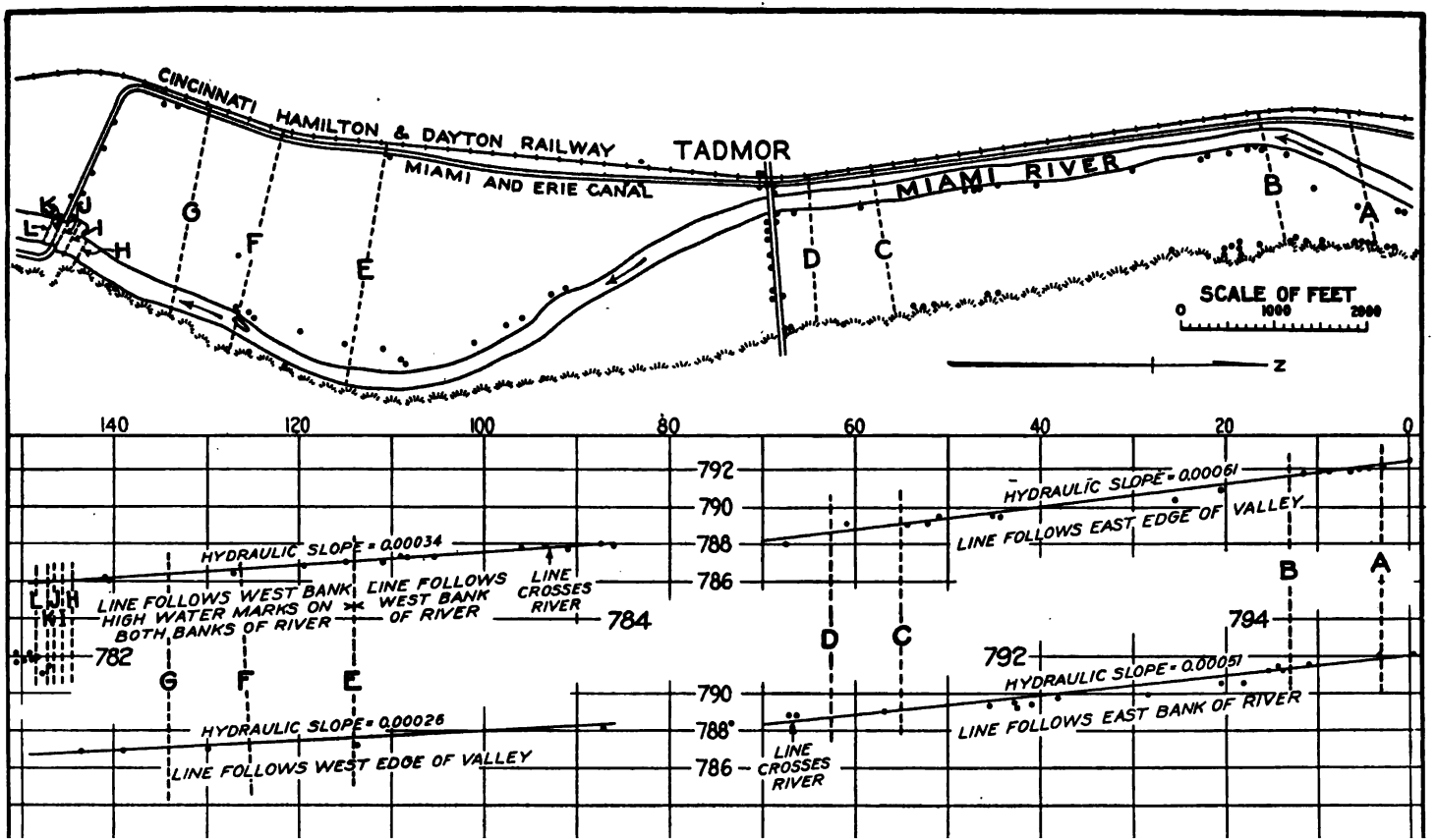


Fig. 24.—Cross Sections of the Miami Valley near Tadmor, Ohio, used in calculating the maximum discharge rate during the flood of March, 1913. The relative position of the various cross sections is shown in the plat, Fig. 25. Each cross section shows the elevation of the cultivated fields across the valley floor, the high water line, the position of the trees along the river banks, and the low water cross section of the river channel (indicated in solid black) at the time the measurements were taken in June, 1913. The scour in the bed of the river channel caused by the contraction at the canal aqueduct crossing is shown in cross sections H, I, J, K, and L.


CINCINNATI HAMILTON & DAYTON RAILWAY
TADMOR
MIAMI AND ERIE CANAL
MIAMI RIVER
K
J
L
I
H
G
F
E
D
C
B
A
SCALE OF FEET
0
1000
2000
Z
140
120
100
80
60
40
20
0
792
790
788
786
784
782
HYDRAULIC SLOPE = 0.00034
LINE FOLLOWS WEST BANK HIGH WATER MARKS ON BOTH BANKS OF RIVER
LINE FOLLOWS WEST BANK OF RIVER
LINE CROSSES RIVER
HYDRAULIC SLOPE = 0.00026
LINE FOLLOWS WEST EDGE OF VALLEY
HYDRAULIC SLOPE = 0.00061
LINE FOLLOWS EAST EDGE OF VALLEY
794
HYDRAULIC SLOPE = 0.00051
LINE FOLLOWS EAST BANK OF RIVER
LINE CROSSES RIVER

tity passed between the abutments of the canal bridge. Hence there was a very high velocity through the opening, accompanied by the necessary fall in water surface to produce this velocity, the situation being ideal for an estimate of discharge from the actual measured head.

That there was a very high velocity through this opening is shown by the facts that the bottom was scoured out as much as 25 feet in places; that the west abutment was undermined and split into two parts, but without materially changing the cross section, as shown in Sections J and K, Fig. 24; and that the piers were undermined and disintegrated, or carried, together with one of the trusses, beyond the limits of the survey. The east abutment was not injured. The two end trusses were swung around parallel to the direction of the current and are now lying along the edges of the channel just below the abutments.

Table 12 gives the detailed slope-area computations for the seven different cross sections of the valley that were measured at intervals over a total length up and down the valley of nearly three miles.

Explanation of Symbols in Table 12

A = area of cross section in square feet
P = wetted perimeter of cross section in feet
R = hydraulic radius of cross section in feet
n = roughness factor in Kutter's formula.
s = surface slope of flood plane
c = coefficient c in Chezy formula
v = velocity in feet per second
q = discharge of part of cross section in second feet
Q = total discharge of cross section in second feet

Table 12.—Maximum Discharge of the Miami River at Tadmor, Ohio, during the Flood of March, 1913
Computed by Kutter's Formula

Cross Section	Part of Section	A	P	R	n	s	c	v	q	Q
		Square feet	Feet	Feet				Feet per second	Second feet	Second feet
	Main Channel	4,980	255	19.5	.035	.00056	73	7.62	38,000	
A	East Overflow	4,890	415	11.8	.037	"	64	5.20	25,400	
	West Overflow	10,770	685	15.7	"	"	67	6.29	67,700	131,100
B	Main Channel	5,230	240	21.8	.035	"	74	8.17	42,800	
	Overflow	14,650	1100	13.3	"	"	68	5.87	86,000	128,800
C	Main Channel	4,590	226	20.3	"	"	73	7.78	35,700	
	Overflow	13,820	1185	11.7	"	"	67	5.42	75,000	110,700
D	Main Channel	4,770	240	19.9	"	"	73	7.70	36,700	
	Overflow	14,580	1125	13.0	"	"	68	5.80	84,600	121,300
E	Main Channel	4,250	210	20.2	.038	.00030	70	5.45	23,200	
	Overflow	25,620	2050	12.5	"	"	64	3.92	100,500	123,700
F	Main Channel	5,760	320	18.0	.042	"	63	4.63	26,700	
	Overflow	25,610	1905	13.5	.038	"	65	4.13	106,000	132,700
G	Main Channel	6,440	320	20.1	.038	"	70	5.43	35,000	
	Overflow	23,260	1840	12.6	"	"	64	3.93	91,500	126,500

Average maximum rate of runoff, 125,000 second feet.

Measurement of Flow Through Bridge Opening

The computations at the canal bridge opening were made in the following manner:

Velocity of approach = 4.2 feet per second
(see computations at Section G, Table 12)

Head at Opening:

Head due to velocity of approach = 0.3 feet

Drop at opening:

Average elevation at beginning of drop-off = 786.4

Average elevation below drop-off = 781.6

Drop-off = 4.8 feet

Total head = 4.8 + 0.3 = 5.1 feet

Friction head:

Assume 0.8 foot lost in friction. Then actual velocity head = 4.3 and corresponding velocity = 16.6 feet per second. Average velocity in drop-off section = square root of average squares $= \sqrt{\frac{16.6^2+4.2^2}{2}} = \sqrt{146.6}$

Length of drop-off section = 300 feet

Slope above drop-off = 0.00030

Then friction loss $= 300 \times 0.00030 \times \frac{146.6}{4.2^2} = 0.75$ feet

Hence we consider assumption to be correct.

Quantity:

Area at point of maximum contraction = 7960 square feet

Velocity = 16.6 feet per second

Quantity = 132,100 second feet

Comparison of Methods of Flood Measurement

The result obtained by the contracted opening method is seen to be greater than the average of those obtained from the valley cross section by 7,100 second feet, or 5.7 per cent. This is fairly typical of the manner in which the results from the two methods checked. In some of the measurements on the main streams the two methods checked within two per cent, while in some of those on the smaller tributaries where the surface slope ranged from 15 to 40 feet per mile, and where the determination of flow through channel sections was most questionable, the discrepancy was as much as 30 per cent. The tendency seemed to be to underestimate the value of the roughness factor "n" on the small streams having steep slopes. The contracted opening measurements were considered to be the more

accurate and reliable in all cases. In determining the final averages at the various locations, the contracted opening measurements were either averaged with the average of the valley section results, or at least given a weight considerably greater than any single one of the slope-area results.

Results of Flood Measurements

Table 13 gives the drainage area, maximum rate of runoff, and runoff per square mile for the various locations surveyed; while the map of the Miami River drainage area given in Fig. 26 shows these results in their proper location. To enable the results to be identified, a letter has been assigned to each location as shown in the table and on the map. The values are seen to be fairly consistent throughout. The effect of the high rates of flow on certain tributary creeks is shown in the measurements on the main stream just below. The storage effect of the Lewistown Reservoir is noticeable down the river as far as Farrington, the unit rates ranging from 71 to 82 second feet per square mile. Below this point the high rates of runoff from the Spring Creek, Lost Creek, and Honey Creek drainage areas, together with the corresponding high rates from the areas draining directly into the river, bring the maximum unit rate up as high as 114 second feet per square mile for the 1128 square miles at Tadmor.

These high rates of runoff from the drainage areas near Troy are consistent with the rainfall records. As will be seen by referring to the map of the drainage area the maximum precipitation seems to have occurred on these areas. The unusual damage to roads and bridges on the higher ground in this vicinity also indicated that extremely high rates of flow had occurred.

Equally high results were obtained on Mad River near Springfield and Osborn, and on Stillwater River at various points below Covington, while a result nearly as large was obtained at Miamitown for a drainage area of 3,937 square miles. The latter result is seen to be exceptionally large when compared with the records at hand of maximum rates of flood flow from areas of similar size and topographic conditions. The peculiar conditions at Dayton partially account for this. The Stillwater, Mad, and Miami Rivers coming together at one place as they do would tend to produce very high rates of flow in the Miami below Dayton even though they did not reach their crest at exactly the same time, while the addition of the crest of the flood from Twin Creek was a factor.

Table 13.—Results of Flood Measurements, Miami Valley Streams, 1913

Part of watershed	Stream	Location	Drainage area	Maximum Rate of Run-off		
			Square miles	Total second feet	Second feet per sq. mile	Inches per 24 hours
Miami River tributaries above Dayton	Tawawa Creek	A. 2 miles East of Sidney	54	12,900	239	8.89
	Turtle "	B. Below M. & E. Canal	35	6,130	175	6.51
	Loramie "	C. Above Turtle Creek	208	25,600	123	4.57
	Spring "	D. Section 13-11-1	27	5,660	210	7.81
	Lost "	E. Section 34-10-2	52	29,700	571	21.23
Miami River above Dayton	Miami River	F. Above Tawawa Creek	498	34,100	69	2.57
	" "	G. At Sidney	555	44,000	79	2.94
	" "	H. Above Lockington	575	48,500	84	3.12
	" "	I. Below Piqua	842	70,000	83	3.09
	" "	J. At Tadmor	1128	127,300	113	4.20
Stillwater River tributaries	Greenville Creek	K. South of Bradford	213	18,200	85	3.16
	Ludlow Creek	L. Above Ludlow Falls	65	17,300	266	9.89
Stillwater River	Stillwater River	M. Above Greenville Creek	223	33,100	148	5.50
	" "	N. At Sugar Grove	448	51,400	115	4.27
	" "	O. At West Milton	611	86,200	141	5.24
	" "	P. Below Little York	657	85,400	130	4.83
Mad River tributaries	Buck Creek	Q. At Springfield	164	11,100	68	2.53
	Donnells Creek	R. Below Donnellsville	27	3,970	147	5.47
Mad River	Mad River	S. At Springfield	505	55,400	110	4.09
	" "	T. At Osborn	649	75,700	117	4.35
Miami River tributaries below Dayton	Twin Creek	U. At Germantown	270	66,000	244	9.07
Miami River below Dayton	Miami River	V. At Miamisburg	2722	257,000	94	3.50
	" "	W. Miami	3937	384,000	98	3.64

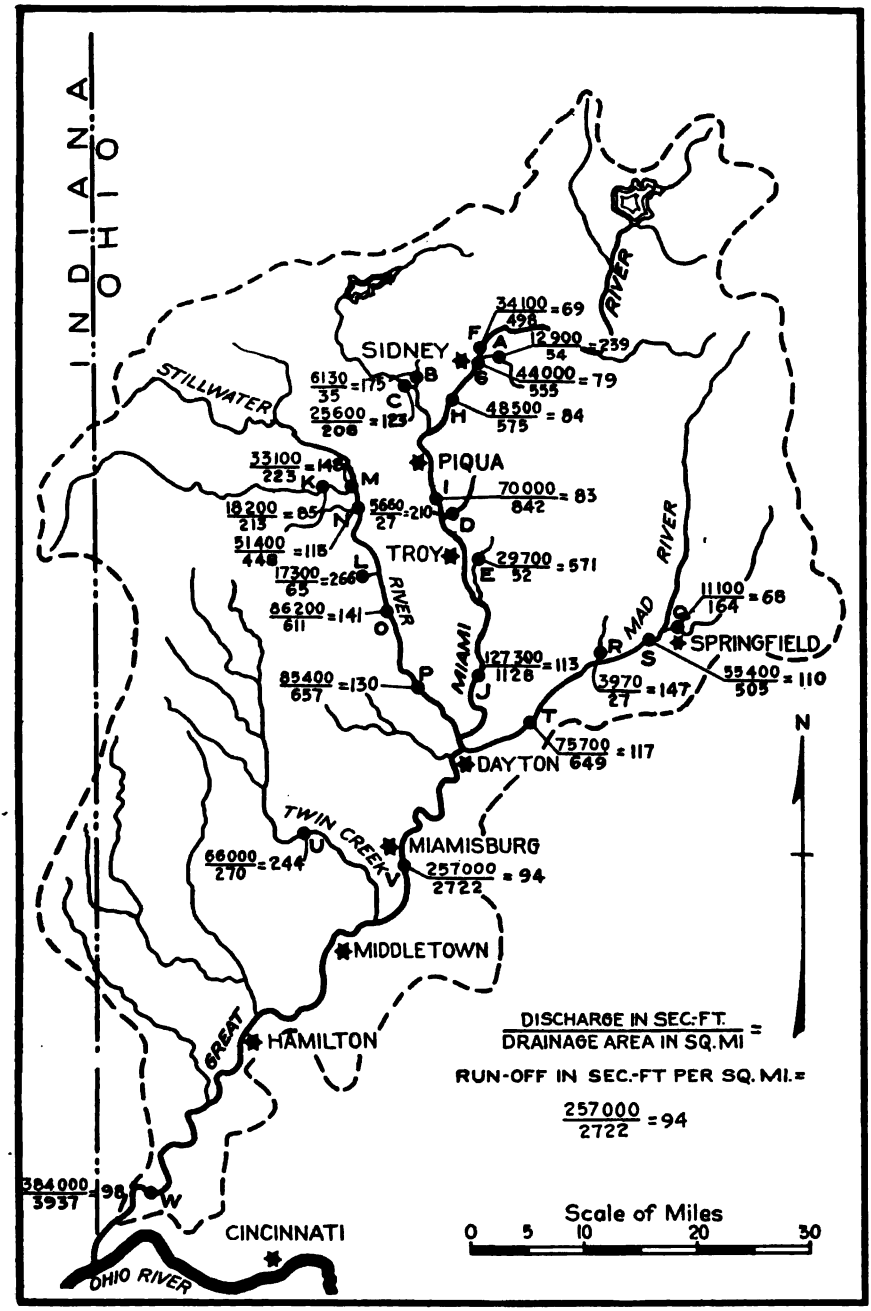


Fig. 26.—Map showing Maximum Rate of Run-off at various points in the Miami Valley during the flood of March, 1913. Based on measurements made subsequent to the flood. In each fraction the numerator is the maximum rate of run-off in second feet, the denominator is the tributary drainage area in square miles, and hence the quotient is the maximum rate of run-off in second feet per square mile.

MAXIMUM RATES OF FLOOD FLOW OF FOREIGN AND AMERICAN RIVERS

An extensive examination of European literature has shown that rates of runoff such as occurred in the Miami River Valley in the flood of March, 1913, are not frequent, but have occurred in certain parts of Europe, and in other countries. In parts of France and Germany, where the topography, permeability of surface, annual rainfall, and character of storms are comparable to those of southwestern Ohio, records of flood rates practically as great as ours have been found; while in mountainous regions having steep slopes and impermeable surfaces, even greater rates have occurred. Table 14 gives a few of the maximum rates obtained in investigations of European rainfall made for this work; a few published by Mr. Kuichling in the 1901 Report of the Barge Canal, state of New York; and a few given by Mr. Kuichling in his discussion of Mr. Fuller's paper on Flood Flows, Transactions of the American Society of Civil Engineers, 1914. Professor D. W. Mead, in his studies of rainfall and floods in China has found that rainfalls and consequent runoff in parts of China are much more severe than the greatest recorded in the Miami Valley.

Table 14.—Maximum Rates of Flood Flow of Foreign and American Rivers

Stream	Locality	Drain. area	Run-off	Date of flood	Authority
		Sq. miles	Sec. ft. per sq. mi.		
Durance	Mirabeau, France	4150	57	1886	1
Garonne	Toulouse, France	4050	57	.....	1
Loire	France	2200	113	1846	2
Loire	Montron, France	1820	105	.....	1
Rhine	Mastrils, Switzerland	1650	65	1868	1
Rhine	Tardisbrücke, "	1633	76	.....	1
Loire	Andrezieux, France	1575	92	.....	1
San	Przemysl, Austria	1420	65	.....	1
Neisse	Germany	955	75	1897	1
Ardèche	France	940	263	.....	1
Verdon	France	933	63	.....	1
Musi	Hyderabad, India	862	493	1908	1
Ardèche	France	831	382	1827	3
Bober	Hammerwerk, Germany	793	85	1897	1
Towbrapoorny	India	587	324	.....	2
Loire	Pertuiset, France	583	148	.....	1
Kinzig	At mouth, Germany	550	77	.....	1
Tessin	Bellinzona, Switzerland	540	163	1868	1
Bober	Mauer, Silesia	467	91	1897	1

Table 14.—Maximum Rates of Flood Flow—(Continued)

Stream	Locality	Drain. area	Run-off	Date of flood	Author-ity
		Sq. miles	Sec. ft. per sq. mi.		
Queis	At mouth, Germany	389	109	1897	1
Kinzig	Ortenburg, Germany	386	100		1
Iller	Kempton, Austria	367	74		1
Ubaye	France	360	128	1843	1
Blèone	France	350	116		1
Coulon	France	348	101		1
Irrity	India	336	446		2
Asse	France	285	110		1
Murg	At mouth, Germany	246	92		1
Ardèche	Vans, France	215	526	1890	3
Bober	Rohrlach, Germany	205	160	1897	3
Bruna	Italy	189	189		2
Queis	Lauban, Germany	187	161	1897	3
Queis	Germany	184	164	1888	2
Ardèche	Aubenas, France	178	694	1890	3
Wiese	Lorrach, Germany	163	108		1
Lessach	Gailthal, Austria	130	167		1
Queis	Marklissa, Germany	118	233	1897	1
Wien	Near Vienna, Austria	84	246		1
Pliessnitz	Germany	77	612	1882	1
Pliessnitz	Germany	58	823	1890	2
Rench	Oberkirch, Germany	52	149		1
Lacken	Warmbrunn, Germany	46	265	1897	1
Borgaglino	Genoa, Italy	36	485	1892	3
Borgaglino	Genoa, Italy	36	421	1908	3
Heidewasser	Herischdorf, Germany	36	287	1897	1
Eyach	Balingen, Wurtemberg	35	356	1895	3
Langwasser	Friedeberg, Germany	24	262	1897	1
Bober	Buchwald, Germany	23	184	1897	1
Elbe River	Spindelmühle, Bohemia	22.4	315	1897	1
Landwasser	Germany	20	368	1887	2
Lomnitz	Erdmannsdorf, Germany	19	329	1897	1
Furens	St. Etienne, France	10	340		1
Wölfel	Wölfelsgrund, Germany	9.6	331	1897	1
Borgaglino	Above Genoa, Italy	8.8	732	1892	3
Le Buech	Mirabeau, France	522	85	1886	1
Yuba	Smartsville, Cal.	1220	91	1909	3
Santa Catarina	Monterey, Mexico	544	590	1909	3
Calaveras	Jenny Lind, Cal.	395	176	1911	3
Devil's Creek	Viele, Iowa	143	1300	1905	3
Goldbach	Arnoldsdorf, Germany	20	269	1903	3

Authorities: 1—Morgan Engineering Co. investigations of European Floods; 2—Kuichling, New York Barge Canal Report, 1901; 3—Kuichling's discussion of Fuller's paper on Flood Flows, Trans. A. S. C. E., 1914.

SCOUR AND DEPOSIT IN RUNNING WATER

Careful experiments and investigations were made as to the velocity of flow in which scour and deposit would occur in river channels. The condition under which silt deposit would be formed and the resulting value or lack of value of silt deposits was carefully investigated. It was found that in many locations in the Miami Valley, as well as elsewhere, lands which occasionally received deposits of silt are held at higher values than lands not receiving such deposits.

CARRYING CAPACITY OF IMPROVED CHANNELS

Estimates of the capacities of the improved river channels depend for their accuracy upon a thorough understanding of the flow of water in channels. Very careful experiments and investigations have been made following similar investigations made by the Morgan Engineering Company on other streams to determine the best manner for applying engineering rules for the measurement of the flow of water in the Miami Valley. This study of measurement of the velocities of water in channels is more thorough and comprehensive than any made before in the United States.

RIVER GAGINGS AND FLOOD WARNINGS

In order to keep a record of the rainfall and amount of water which runs off through the streams of the valley in times of floods a considerable number of rainfall and river gaging stations have been installed throughout the district and observations have been made since May, 1913, in co-operation with the United States Weather Bureau and the United States Geological Survey. These records have helped materially in planning improvements for the district and will continue to be of great value in helping to estimate the probable size of floods from the records of rainfall. As long as this work is maintained, people of the valley need never be without warning in advance of a great flood, either during or after completion of the flood prevention work.

BORINGS

In order to be certain as to the foundation materials under the dams it has been necessary to make a great many soil and rock borings. The plans for dams have not been based upon the assumption of what the soil conditions might be, but upon actual investigations of soil through borings and test pits. Borings have also been made over the areas where earth must be secured for building the dams, so that it may be accurately known in advance what class of material will be used and where it may be obtained.

TESTS OF MATERIALS OF CONSTRUCTION

A long series of tests of the rock, gravel, and sand found in the valley has laid the basis for the accurate proportioning of concrete in construction works, so as to get the greatest strength and durability at the least cost.

PART II

DEVELOPMENT OF THE PLAN

PART II

DEVELOPMENT OF THE PLAN

As previously stated, the plan aims to reduce and control the flow of the Miami River and its principal tributaries so that during the greatest possible flood the amount of water flowing in the river through the cities will be no more than can be carried safely in the improved channels. In some cases small groups of houses will not be protected from flooding, but these are cases where the value of the property at stake is not sufficient to justify the expense of protection. Floods destructive to farm lands will be prevented in the river below, but moderate overflow of farm lands will occur occasionally, it having been established that such occasional moderate overflows during the winter months in most cases are more of a benefit than a detriment.

REASONS FOR ADOPTING THE RETARDING BASIN PLAN RATHER THAN OTHER PLANS

Before the plan for retarding basins was adopted a careful study was made of the flood problem in each city and village, and an effort was made to work out the best possible plan for local protection.

When the investigation of the flood control problems was undertaken in May, 1913, it was assumed that relief was to be found by means of local channel improvements, and for several months attention was centered on this type of improvement. At the same time, however, every method of flood control within the range of possibility was carefully considered. Plans for protection by each method were prepared to a point where it was definitely determined whether that method was or was not feasible.

Such proposed plans included the diversion of the rivers into other streams or into new channels, the construction of many small retarding basins, the construction of a few large retarding basins, the construction of permanent reservoirs which would serve flood prevention and other purposes, the canalizing of the river; and local flood control works at the cities by a variety of methods. Very few of the possibilities investigated proved to be practicable. It was found possible at moderate expense to divert the water of Mad River into the Little Miami. but this would simply have transferred the flood problem to another part of the State, and the plan was

abandoned. The relief of the Miami Valley as a whole, by channel improvement alone, was found to be so excessively expensive to construct and so difficult to maintain as to be entirely impracticable. Local channel improvement was found to be possible for some cities, but entirely impossible for others. By-passes for carrying flood water around the cities in most cases were found to be too expensive to warrant consideration. A system of many small retarding basins was found to be wholly impracticable, as it is only where basins can be filled to a considerable depth that this method is economical. The construction of permanent reservoirs for combined flood prevention and power purposes was found not to be feasible, because the same storage space can not at the same time be used for storing water for power production, and be kept unoccupied and available for storing water in time of flood. Only by creating storage space additional to that necessary for holding flood waters, can power development and flood control be provided for at the same time. In Europe such combinations have frequently worked out to advantage. In the Miami Valley, however, the extra cost in each case would be greater under present conditions than the resulting benefits, the more so because permanent flooding of the detention basins in the Miami Valley would destroy valuable agricultural lands, which under the retarding basin system will continue in cultivation, and will increase in fertility.

As the investigations proceeded, and as data became available from the surveys throughout the District, it became obvious that no one method of improvement taken by itself could solve this problem. The solution was found to be a system of retarding basins supplemented by local channel improvements, the improvement by each method being carried to a point where further protection could be more economically secured in some other manner. The final balance between the different elements of the plan was reached only after many estimates and comparisons; the plan adopted being one of scores of combinations that have been worked out in great detail during the past two and a half years.

DETERMINATION OF DETAILS

Not only were numerous comparisons made in determining the general features of the plan, but the same course was followed in finally determining the details. For instance, in most cases there were numerous possible locations for the dams which will form the retarding basins. One location might be most favorable so far as the location of the dam itself was concerned, while another would

possess more favorable conditions for the location of conduit or spillway. Again, the apparent balance of economy as seen from the surface might be entirely upset by soil borings indicating unfavorable conditions in the underlying rock, and in the end all these conditions might be set aside by the impracticability of securing enough earth in that particular location for building the dam at reasonable cost.

With a dam finally located there would be several possible spillway or conduit locations to choose from, and these were determined by elimination, as were the larger features. Over the entire project, both with regard to retarding basins and to channel improvements this same policy of comparison and elimination was followed.

This detailed study at times disclosed difficulties which indicated the necessity for additional expense in order to insure complete safety in the final plan, or made apparent the possibility of adding additional safe guards. At other times opportunities were found for taking advantage of favorable conditions, and to reduce the cost. Not until the final selections of details had been made and the items summed up, could a definite and accurate statement be made of the total cost.

LOCATION OF RETARDING BASINS

After the investigation of about twelve possible retarding basin sites, five locations are selected to be recommended for inclusion in the official plan. These locations are shown on the map, Fig. 1, and are as follows:

Germantown Retarding Basin on Twin Creek,
Englewood Retarding Basin on Stillwater River,
Lockington Retarding Basin on Loramie Creek,
Taylorsville Retarding Basin on Miami River,
Huffman Retarding Basin on Mad River.

In selecting these sites, the elements affecting the choice which were taken into consideration, are: necessary storage at a minimum cost; least disturbance to cities, railroads, and other improvements; and finally, good locations for the spillways.

OPERATION OF RETARDING BASINS

Each basin is to be formed by building across the valley an earth dam of the safest and most durable type. Permanent openings through the dams in the shape of concrete outlet conduits will permit the ordinary river flow to pass through unobstructed. The

size of these outlets will be such that at the times of highest floods only such amounts of water will escape through them as can be safely taken care of in the channels below the dams. The excess water will be held back in the Retarding Basins to flow away after the natural course of the flood has passed. Except at times of flood flow, the dams will not disturb the river flow and thus, ordinarily, the basins will be empty and dry.

In addition to the system of Retarding Basins, certain channel improvements will be made through the cities, in order that the capacity of these channels shall never be exceeded. These necessary channel improvements form a part of the proposed official plan.

Before outlining the details of the plan, it is essential to indicate the manner of arriving at the principal conclusions on which the plan is based.

DEGREE OF FLOOD PROTECTION NEEDED

In fixing upon the number and capacity of flood Retarding Basins required, the first thing to be determined is the degree of flood control which is needed, or, in other words, the maximum future flood which may ever be expected to occur, and against which protection must be provided.

Although accurate discharge hydrographs are lacking for big floods for areas such as exist here, the U. S. Weather Bureau has extensive and reliable records of rainfall extending over considerable periods of time. Hence we can compare extreme flood conditions by the rainfall and other weather conditions producing them, rather than by actual observed hydrographs.

In an exhaustive search of the U. S. Weather Bureau files, we have compiled the detailed rainfall figures for the largest 25 storms, of which records exist, that have occurred in this country east of the Rocky Mountains. Of this list, 22 have occurred during the last 20 years, and we know that we have the records of all the heaviest storms that have occurred during this period. Previous records are so much more scanty that, although we have the facts concerning three among the largest storms, there are no definite means of knowing how numerous or how frequent were other storms of a size somewhat similar to those recorded.

With great labor the rainfall records of all these storms have been plotted on maps, rainfall contours have been drawn, and their areas measured with a planimeter. By this means, for each storm, the center of heaviest rainfall has been located and the average depth of rainfall over the area contained within each contour has

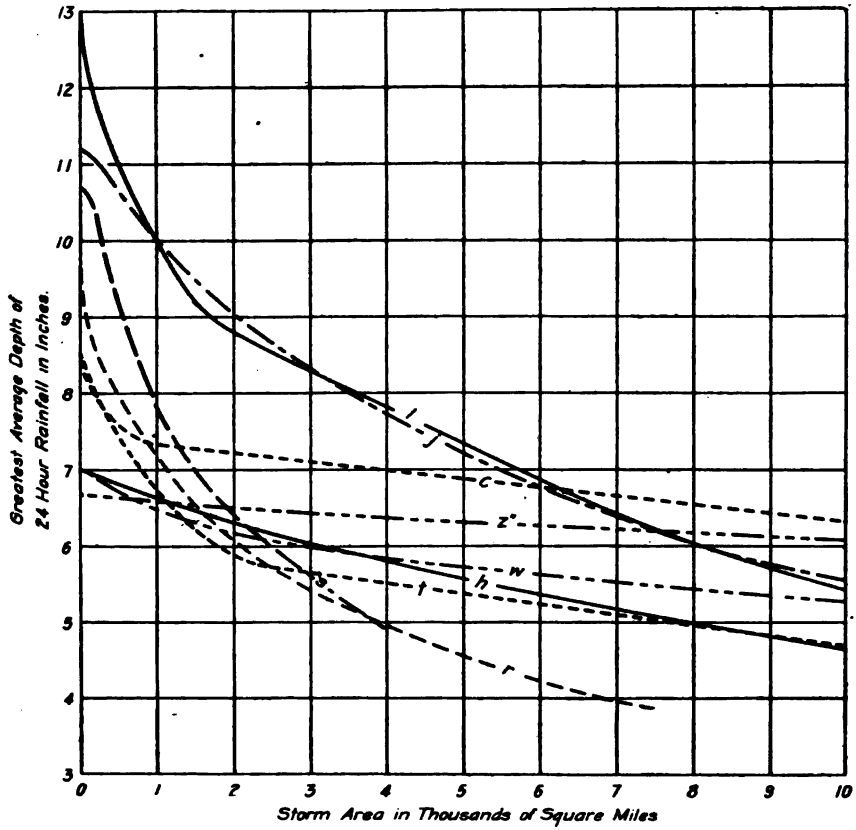


Fig. 27.—Maximum 24-Hour Rainfall for the Greatest Recorded Storms in the Upper Mississippi Valley. The diagram shows the greatest average depth of 24-hour rainfall in inches over different sized areas in the center of each storm.

been calculated. This process has been carried out in each case for the 24 hours of greatest rainfall, for the 48 hours of greatest rainfall, for the 72 hours of greatest rainfall, and so on for as many days as the storm continued. These different sets of figures have all been plotted, thus giving a set of time-area-depth curves for each storm.

The largest storms have occurred in the southern states and the greatest of these have been decidedly heavier than any that have occurred in this part of the country. Hence for further study in connection with this project the storms which have occurred between the Rocky Mountains and the Appalachians, and whose centers have been north of the Ohio River or north of the southern boundary of Missouri and Kansas, but including one from Arkansas, have been selected. This list includes nine storms. Their time-area-depth curves are shown on Figures 27, 28, and 29.

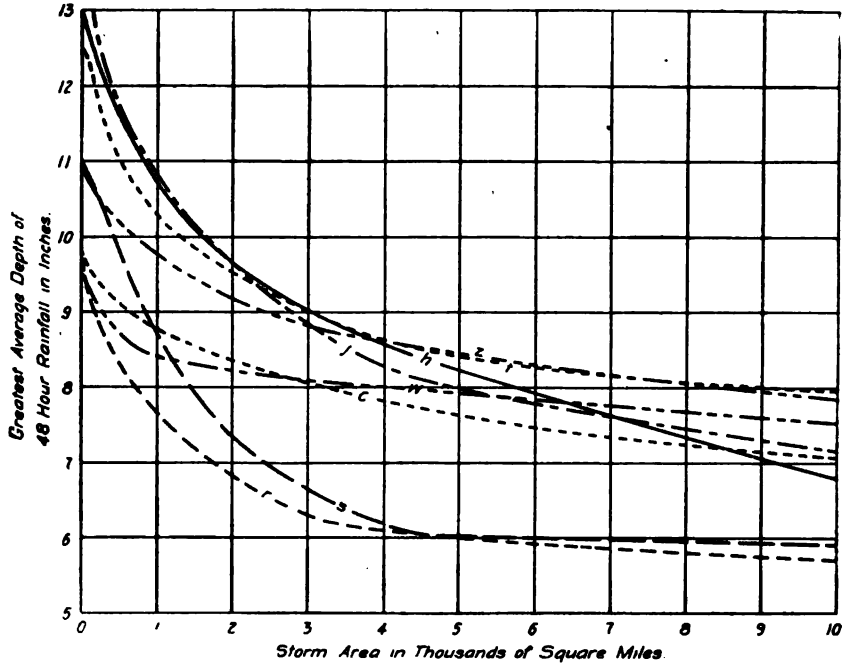


Fig. 28.—Maximum 48-Hour Rainfall for the Greatest Recorded Storms in the Upper Mississippi Valley. The diagram shows the average depth of 48-hour rainfall in inches over different sized areas in the center of each storm.

This list of storms is as follows:

c.	1889, May 31-June 1,	center	over	Pennsylvania
h.	1900, July 14-16,	"	"	Iowa
j.	1903, Aug. 26-28,	"	"	Iowa
l.	1905, June 9-10,	"	"	Iowa
r.	1909, July 5-8,	"	"	Kansas
s.	1909, July 19-22,	"	"	Michigan
t.	1910, Oct. 4-6,	"	"	Southern Illinois
w.	1913, March 23-27,	"	"	Ohio
z.	1915, Aug. 17-20,	"	"	Arkansas

In storm "l," the entire precipitation was within a period of 24 hours, though it was divided between two successive days, hence we have treated it as a one-day storm. In storms "r," "s," "t," and "w" but little precipitation occurred outside of the 3-day period of greatest precipitation.

From these diagrams the figures in Table 15 have been obtained. The table shows the depth in inches of the greatest average rainfall

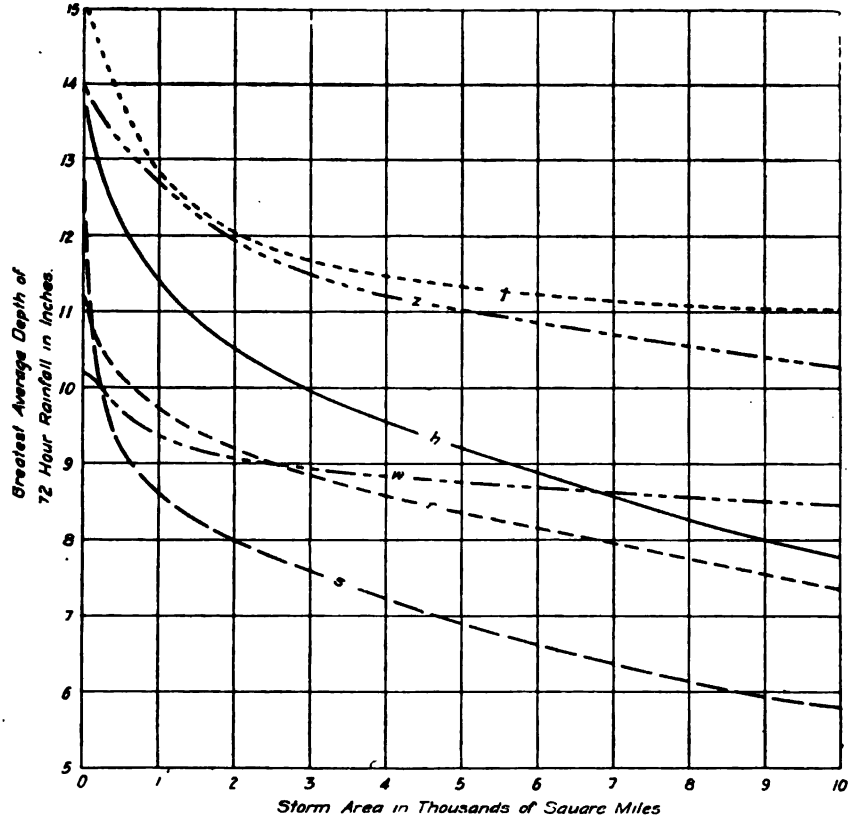


Fig. 29.—Maximum 72-Hour Rainfall for the Greatest Recorded Storms in the Upper Mississippi Valley. The diagram shows the greatest average depth of 72-hour rainfall in inches over different sized areas in the center of each storm.

in 24, 48, and 72 hours on areas of 1, 500, 1000, 1500, 2000, and 2500 square miles, during the nine greatest recorded storms in the upper Mississippi Valley.

Measurements of the 1913 rainfall contour maps show that the center of the storm passed directly across the middle of the drainage area above Dayton, and that the most intense three days' rainfall on this area was 7.9 inches, while, as shown in Fig. 29, the most intense rainfall, during the storm, on an equal area, partly within and partly outside the Miami River drainage area, was about 9 inches. Naturally an area of maximum rainfall will never exactly coincide with the limits of any particular drainage area.

Each of the storms listed on page 86, all of which have occurred in the Mississippi Valley within the last fifteen years, might have

Table 15.—Depth in Inches of the Greatest Average Rainfall on Areas of Various Size During 9 Greatest Recorded Storms That Have Occurred in the Upper Mississippi Valley

	Storm	Center	Greatest 24 Hour Rainfall for Area in square miles						Greatest 48 Hour Rainfall for Area in square miles						Greatest 72 Hour Rainfall for Area in square miles					
			1	500	1000	1500	2000	2500	1	500	1000	1500	2000	2500	1	500	1000	1500	2000	2500
c	1889, May 31-June 1	Pa.	8.4	7.6	7.3	7.3	7.2	7.2	9.8	9.1	8.8	8.6	8.4	8.2						
h	1900, July 14-16	Iowa	7.0	6.8	6.6	6.5	6.3	6.2	13.0	11.6	10.7	10.1	9.7	9.3	13.7	12.2	11.4	10.9	10.5	10.2
j	1903, Aug. 26-28	Iowa	11.2	10.7	10.0	9.5	9.0	8.7	14.7	11.7	10.8	10.2	9.7	9.2						
l	1905, June 9-10	Iowa	13.0	11.0	10.0	9.2	8.8	8.5												
r	1909, July 5-8	Kans.	9.7	8.0	7.2	6.5	6.1	5.7	9.7	8.3	7.7	7.2	6.8	6.5	11.2	10.2	9.7	9.4	9.2	9.0
s	1909, July 19-22	Mich.	10.7	9.2	7.8	7.0	6.4	6.0	11.0	9.8	8.7	7.9	7.4	7.0	12.8	9.2	8.6	8.3	8.0	7.8
t	1910, Oct. 4-6	So. Ill.	8.5	7.5	6.7	6.2	5.9	5.7	12.5	11.0	10.3	9.9	9.5	9.3	15.2	13.8	12.8	12.4	12.1	11.8
w	1913, March 23-27	Ohio	7.0	6.7	6.5	6.3	6.2	6.1	9.5	8.7	8.4	8.3	8.2	8.1	10.2	9.7	9.4	9.2	9.1	9.0
z	1915, Aug. 17-20	Ark.	6.7	6.6	6.6	6.5	6.5	6.5	10.9	10.2	9.8	9.4	9.2	9.0	14.0	13.2	12.7	12.3	11.9	11.7

passed through the vicinity of the Miami River drainage area, since this region lies in the path which such storms ordinarily take in moving across the country. But although several of the other storms listed in this table were considerably heavier than that of 1913, it will be noted that every one of these heavier rains occurred during the summer or fall, during which seasons the proportion of heavy storm rainfall running off is generally only half or two-thirds as great as during the winter or early spring. Complete examination of all existing rainfall records indicates that no rainfall greater than that of March, 1913, has been recorded in the central United States during winter or spring months, and therefore, that no rainfall has been recorded throughout this whole region which would have produced a greater flood than that of March, 1913.

As an added safeguard, however, to give a feeling of absolute security, it was decided to provide a degree of protection considerably in excess of that required to prevent damage by a flood like that of 1913. It is not expected that any considerable part of this additional capacity of retarding basins will ever come into use. Its function during great floods will be to stand empty, mute evidence, visible to all, that the limit of the flood prevention works is not being approached, and that, therefore, no cause for apprehension exists.

In deciding upon the magnitude of the storm which shall be adopted as the maximum against which protection shall be provided, two elements have to be taken into account, namely, the duration of the storm, and the total depth of rainfall. Of various storms having the same amount of total rainfall, that one in which the rainfall comes most rapidly, or in which the number of days covered is least, will be the most difficult to provide protection against.

It is well known that the runoff resulting from a heavy rainfall always persists for a much longer period than the rainfall producing it, and the maximum rate of runoff is correspondingly less than the maximum rate of rainfall. It is impossible to predict precisely the runoff curve from a given rainfall because the former depends upon the size of the drainage area, its topography, surface cover, and the moisture content of the soil previous to the occurrence of the storm. At the time of maximum rate of runoff, there is always a considerable amount of water stored on the ground surface and in small drainage channels in the process of flowing away. In the 1913 flood this seems to have amounted approximately to 2½ inches over the drainage area above Dayton. This amount slowly drains away after the storm, sinks into the soil, or evaporates. On account of all the uncertainties involved in an attempt to form a runoff curve

based on an assumed type of maximum storm rainfall, it was decided to adopt a maximum runoff curve instead of a maximum rainfall curve, due care being used that the runoff curve adopted as a maximum should be consistent with the known facts derived from flood hydrographs, and that it should be large enough to provide the desired margin of safety.

For Retarding Basins of large relative capacity it is immaterial whether the inflow reaches the basin in one day or in several. So long as the capacity of the basin is not exceeded, the inflow might enter the basin instantly without unfavorably influencing the operation of the basin. For the most extreme conditions, however, the length of time of inflow is important, since it determines the amount of the outflow through the outlet conduits. After a study of the preceding rainfall tables it was decided to assume as a basis for the design of the Retarding Basins a maximum inflow curve for the various drainage areas covering a period of three days. Such a runoff curve would correspond to a heavy rainfall covering from one to two days.

The amount of flood runoff in a given length of time must always be less than the maximum precipitation in an equal length of time, on account of evaporation, ground absorption and surface retardation of the runoff. Also, as already stated, the chance is negligible that the area of maximum rainfall in any storm will ever correspond exactly with the boundaries of a single drainage area. Moreover, as already pointed out, all the great rainstorms recorded in Table 15, except that of March, 1913, occurred during the summer and fall months, when the proportion of rainfall which runs off is comparatively small. So greatly different is the runoff of summer and fall from that of winter and spring that nearly all floods in the Miami occur during the winter and spring, though some of the heaviest rainfalls occur during the summer. In view of these facts it was decided that, if the Retarding Basins were planned for a total runoff of 10 inches in 3 days for the smaller drainage areas, a wide margin of safety would be provided. This runoff was accordingly adopted as the maximum flood for purpose of design.

On account of the well-known fact of greater delay of runoff from large drainage areas, it seems consistent to modify the above standard for the largest areas considered. The Retarding Basins for these drainage areas have relatively large outlet conduits and hence with an extension of the time of inflow a much larger quantity of water can be taken care of on account of the large rate of outflow. The assumed standard inflow type curve could have been modified either by increasing its duration keeping the total inflow

the same, or by keeping the time the same and changing the total inflow, or by changing both the total inflow and its duration. For the large drainage areas it seems safest to preserve the condition of a concentrated inflow in a relatively short time since this imposes the most severe condition upon the retarding basins with large outlet conduits. Hence a standard maximum runoff of 9½ inches in 3 days was assumed, in order to provide the same margin of safety for the Taylorsville and Huffman Basins as for those having smaller drainage areas. This corresponds approximately to a flow of 10 inches in 3-1/3 days.

The Englewood Retarding Basin has nearly as large a drainage area as the Huffman and hence it might appear that the 9½-inch standard should also have been adopted for this case. The outlet for the Englewood Retarding Basin is, however, relatively small, so that while for a three-days' storm the 9½-inch standard would leave it in as favorable condition as the Huffman Retarding Basin, in case of a storm of longer duration than three days, its smaller outlet capacity would give the basin less capacity for handling the inflow than the Huffman Retarding Basin with its larger outlets. On account of this condition it is necessary to give the Englewood Retarding Basin a capacity unnecessarily large for a three-days' storm, in order to provide the desired margin of safety in case of a storm of longer duration. The 10-inch standard in three days was therefore retained for Englewood.

It remains only to explain the details of the shape adopted for the assumed maximum flood runoff curves extending over the period of three days, as shown in Fig. 30. An actual flood hydrograph from a small area has always a rather sharp, thin crest. The assumed flood runoff curve for the smaller drainage areas has, therefore, been given steeper slopes than that for the larger areas. In the absence of any known standard the highest point has been arbitrarily cut off by a straight horizontal line assuming that the flow would remain constant at the highest rate for 24 hours. While a retarding basin is filling rapidly, irregularities in the shape of the inflow curve do not have much effect on the final result, provided the average rate of inflow is correctly known. This is the justification for assuming the maximum stage constant for so long a period as 24 hours.

For drainage areas of the size of those dealt with in the Miami Valley, the rate of rise of a flood is always much faster than the rate of fall. After a careful examination of the data, it was decided that the time of falling during that part of the curve with which we are concerned would be taken as twice as long as the time of rising.

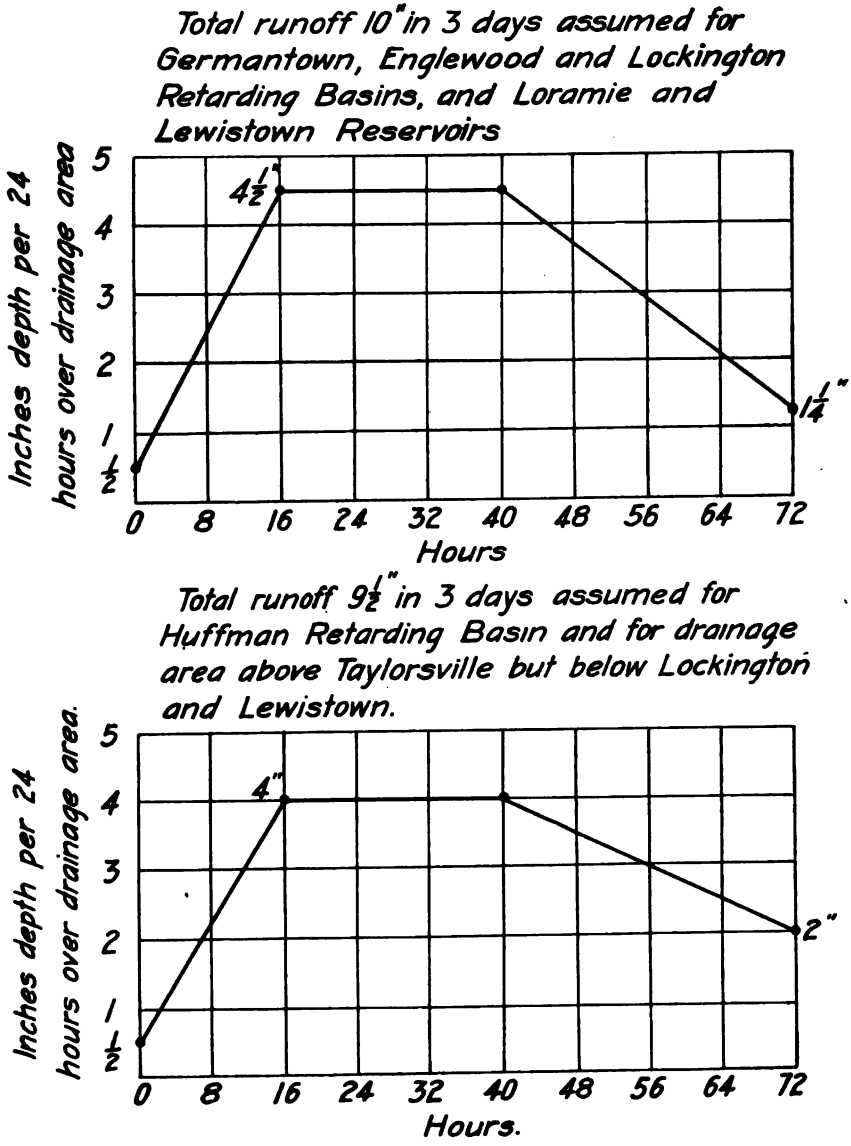

Total runoff 10" in 3 days assumed for Germantown, Englewood and Lockington Retarding Basins, and Loramie and Lewistown Reservoirs
Inches depth per 24 hours over drainage area
5
4
3
2
1
½
4½"
1¼"
0 8 16 24 32 40 48 56 64 72
Hours
Total runoff 9½" in 3 days assumed for Huffman Retarding Basin and for drainage area above Taylorsville but below Lockington and Lewistown.
Inches depth per 24 hours over drainage area.
5
4
3
2
1
½
4"
2"
0 8 16 24 32 40 48 56 64 72
Hours.

Fig. 30.—Maximum Flood Runoff Curves adopted for use in designing the Miami Valley Retarding Basins and Outlet Conduits.

This gives 16 hours for the time of rising and 32 hours for the time of falling which with the 24 hours for the constant level crest makes a total of 72 hours.

A flood does not start from an initial flow of zero but from some intermediate stage of the stream. It was, therefore, decided to begin the assumed flood hydrograph with a rate of ½ inch per 24 hours over the drainage area.

The water in the retarding basin will reach its maximum stage at the latter part of the flood, when the inflow has fallen to the same rate as the flow through the outlet conduits. Hence, for the design of the retarding basins it was not desirable to carry the flood curve beyond the point where it had fallen approximately to the capacity of the outlet conduits. Accordingly, the runoff diagram was completed by assuming the final rate of flow at the end of the three-day period to be at the rate of 1¼ inches per 24 hours over the drainage area, for those cases using the 10-inch total runoff, and to be at the rate of 2 inches per 24 hours over the drainage area for those cases with the large outlet conduits using the 9½-inch total runoff.

Summarizing the preceding discussion, the maximum flood runoff from the tributary drainage areas, which, for purpose of design, has been assumed considerably in excess of that of 1913, is as follows:

For the Germantown, Englewood, and Lockington Retarding Basins, and for the present existing state reservoirs on Loramie Creek and at Lewistown, a total runoff equal to 10 inches in depth over the tributary drainage area, as shown on Fig. 30, distributed over a period of three days as follows:

Beginning with an initial rate of runoff equivalent to a depth of ½ inch in 24 hours over the tributary drainage area, rise uniformly for a period of 16 hours to a maximum rate of runoff equivalent to a rate of 4½ inches in 24 hours over the drainage area, remain constant at this rate for a period of 24 hours, then decrease uniformly during a period of 32 hours to a final rate of 1¼ inches in 24 hours in depth over the tributary drainage area.

For the Huffman Retarding Basin and for the 778 square miles draining into the Taylorsville Retarding Basin below the Lockington Basin and the Lewistown Reservoir, a total runoff of 9½ inches in depth over the tributary drainage area distributed over a period of three days as follows:

Beginning with an initial rate of runoff equivalent to a depth of ½ inch in 24 hours over the tributary drainage area, rise uniformly for a period of 16 hours to a maximum rate of runoff equivalent to a rate of 4 inches in 24 hours over the drainage area, remain constant

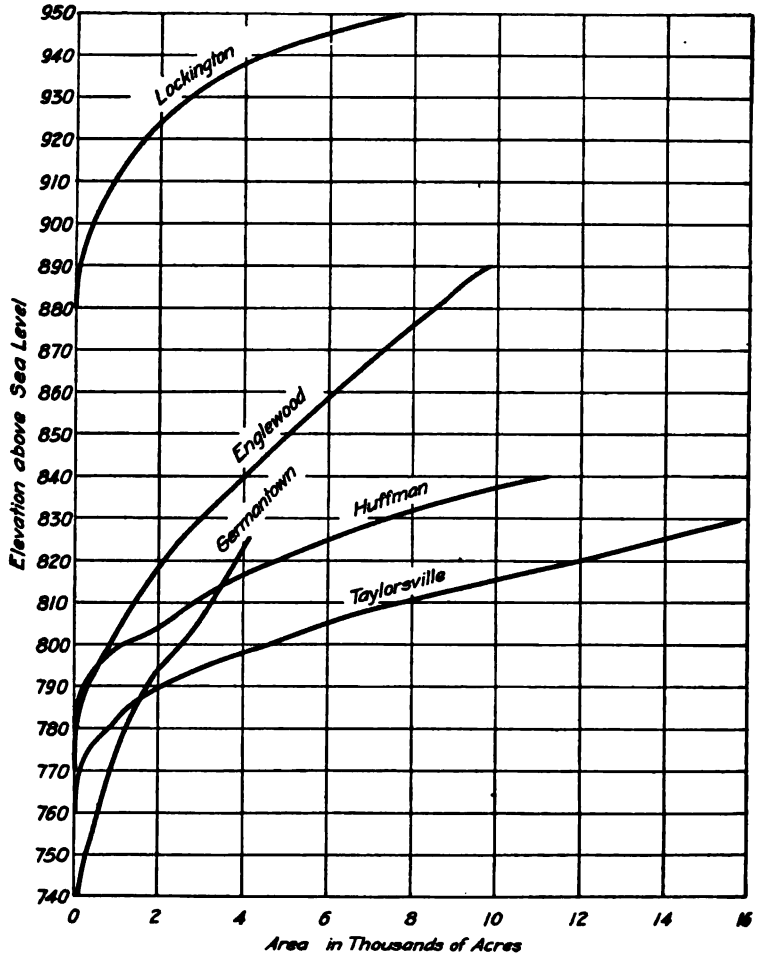


Fig. 31.—Area Curves for all of the Proposed Retarding Basins, showing the area of the water surface in acres for all depths of water.

at this rate for a period of 24 hours, then decrease uniformly during a period of 32 hours to a final rate of 2 inches in 24 hours in depth over the tributary drainage area.

During the 1913 flood the maximum runoff in 3 days from the total tributary drainage area above Dayton was 6.94 inches in depth. The maximum flood assumed above for purpose of design provides a margin of safety above the 1913 flood of about 40 per cent.

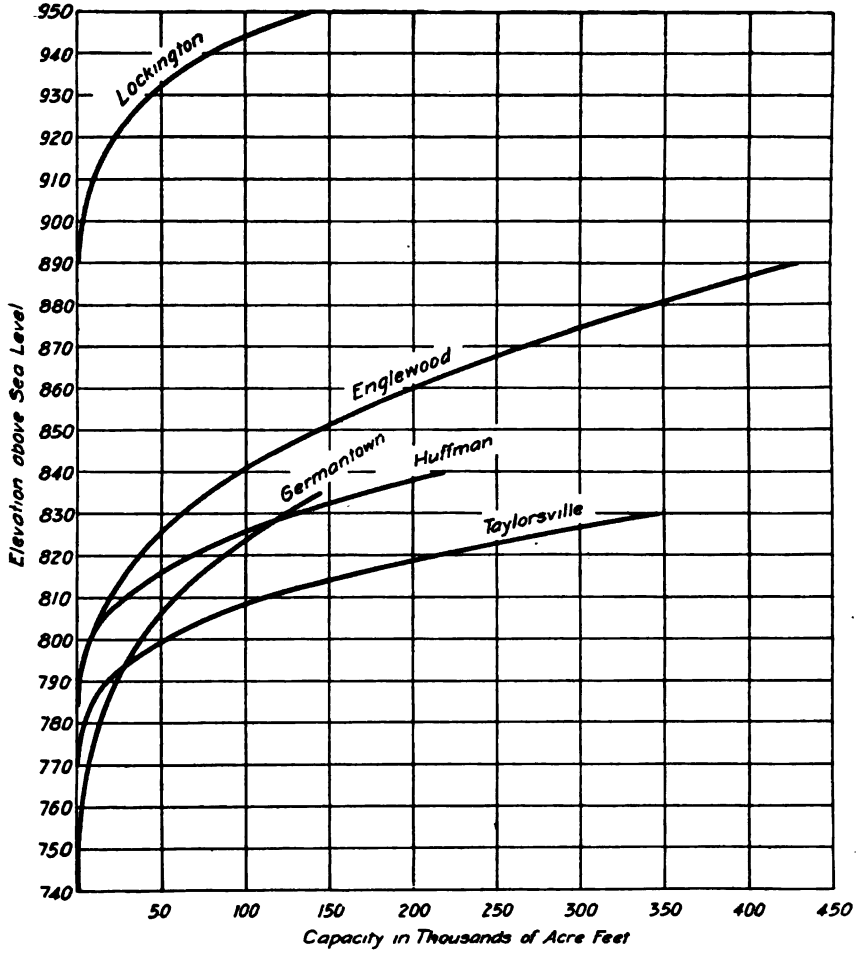


Fig. 32.—Capacity Curves for all of the Proposed Retarding Basins, showing the capacity of each basin in acre feet for all depths of water.

AREA AND CAPACITY OF RETARDING BASINS

Figures 31 and 32 give area curves and capacity curves for all the proposed Retarding Basins showing for each basin the area submerged in acres and the capacity in acre feet for all depths of water. The data for making these curves was obtained from measurements on the detail topographic maps of the basin locations, which were themselves based on complete topographic surveys.

ACTION OF RETARDING BASINS DURING LARGE FLOODS

When a large flood occurs the retarding basins will fill rapidly at first because at the lower levels the storage capacity is very small. Later the level will rise much more slowly both because the storage capacity increases very rapidly at the greater depths and because with the increased head on the outlet conduits their discharge is correspondingly increased.

Towards the end of the flood the water level changes more and more slowly until it finally becomes stationary at the highest level reached. It will continue to rise, however, as long as the amount entering is greater than the amount of the discharge from the conduits.

As a flood in a river subsides much more slowly than it rises, it will be a considerable time after the occurrence of the crest of the flood in the river above the retarding basin before the amount of water entering the retarding basin will have fallen to an amount equal to the discharge from the outlet conduits. The time of greatest elevation in the retarding basins, therefore, will occur after the time of the crest of the flood in the river above the retarding basin.

HEIGHT OF DAMS AND SIZE OF OUTLET CONDUITS

The next step in designing the retarding basin system is to fix the height of each dam, and the size of the outlet conduits through the dam. The process of doing this is as follows:

With the assumed maximum runoff of 10 inches, or five-sixths of a foot in depth, occurring in three days, the total runoff in acre feet above a dam site is equal to five-sixths of the number of acres in the tributary drainage area. This gives the total quantity of water that the retarding basin, in order to provide the desired margin of safety, must be capable of handling in three days, either by storing it, or releasing it through the outlet conduits. In other words, the sum of the amount stored in the retarding basin and the amount flowing out through the conduits in three days must equal the total ten-inch runoff.

If we then assume a tentative elevation as the maximum height to be reached by the water within the retarding basin, we obtain at once from the capacity curve the total amount of water stored in the retarding basin at this time. Deducting the amount so stored, from the total runoff leaves the amount which must be discharged through the outlet conduits.

By numerous trial calculations, it was established that for very sudden intense runoffs, such as our assumed maximum storm, in retarding basins of the shape and capacity of ours, the average rate of discharge through the conduits, during the three days of filling the retarding basin, is very nearly five-sixths of the maximum rate of discharge through the conduits when the retarding basin is full.

Hence, knowing the total amount of water to be discharged through the conduits, the average rate of discharge during the three-day period can be calculated, and then by multiplying by six-fifths, we have the maximum required outlet capacity. From this the dimensions of the outlet conduits are determined.

This process was used in all the retarding basins. Various maximum elevations of water surface were taken and the corresponding sizes of the outlet conduits calculated. By means of these, the final sizes adopted were selected. It was necessary to keep the sum of the discharges from the various retarding basins down to such quantity as could be safely taken care of in the improved channel through the cities below.

In those retarding basins where there is abundant storage capacity available, such as at Germantown, Englewood, and Lockington, the dams could have been made higher than the ones recommended, if there had been any reason for so doing, or the outlet conduits could be made as small as desired. But considerations other than their capacity to hold back flood water make it undesirable to have the outlet conduits too small. In fixing upon the minimum size of these outlet conduits, factors taken into consideration were the frequency and height of small floods in the retarding basins and the time of emptying the basin after a large flood.

If the outlet conduit should be too small, frequent flooding would occur in the bottom of the retarding basin during small rises in the stream. The time required to lower the water a certain distance in the retarding basin would vary exactly inversely as the capacity of the outlet conduit, provided there were no inflow into the basin during the same period. When the outflow is only slightly greater than the inflow, any small increase in the outflow would hurry the rate of emptying in an entirely disproportionate degree. Hence, a small increase in the size of the outlet conduit, which might have no importance in the degree of control of a large flood, could very much reduce the time required to empty the retarding basin after the large flood.

For a large flood, when the capacity of the outlet conduit is small compared with the natural flood flow, a moderate change in the size of the outlet conduit has no appreciable effect upon the degree of flood control, and hence the size of the small conduits has been fixed chiefly with reference to tehir effect upon small floods and their effect upon the time of emptying the full basins.

As an example of the degree of protection afforded the cities of the valley, the conditions as they will obtain at Dayton, may serve. The following figures show that a flood of 110,500 second feet will enter the upper portion of Dayton during the maximum recorded storm, as increased by the adopted margin of safety.

From Englewood outlet conduit	12,000	second feet
From Taylorsville outlet conduit	55,000	" "
From Huffman outlet conduit	35,000	" "
From 70 square miles below retarding basins at rate of 4½ inches depth in 24 hours	8,500	" "
Total	**110,500**	**second feet**

Since the improved channel at Dayton will have a capacity of 115,000 second feet, with a 3-foot freeboard on the levees, it is seen that the desired margin of safety is amply secured.

Table 16.—Total Run-off in Inches Which Will Just Fill Basins to Spillway Level if Entering During the Respective Time Intervals Shown

Basin	0 Days	1 Day	2 Days	3 Days	4 Days	5 Days
Germantown	7.30	8.45	9.60	10.75	12.13	13.51
Englewood	8.99	9.56	10.13	10.70	11.38	12.06
Lockington	6.68	7.78	8.87	10.00	11.31	12.62
Taylorsville*	4.42	6.12	7.82	9.51	11.52	13.57
Huffman	4.66	6.28	7.90	9.52	11.47	13.42

* Taylorsville figures are for the area of 778 square miles above the Taylorsville dam and below the area of 355 square miles above the Lockington and Lewistown dams. In making the computation it was assumed in each case that the Lockington basin was filled exactly to the spillway level.

The above table is computed in the following way:

The column for zero days is the capacity of the retarding basins.

The columns for 1, 2 and 3 days are obtained by adding to the capacity of the retarding basins the volume that would be discharged during these time intervals with an average rate equal to five-sixths the maximum outlet capacity.

The columns for 4 and 5 days are obtained by adding to the amounts in the 3-day column the volume that would be discharged during the additional time intervals at the maximum outlet capacity.

An investigation of the total runoff in inches required to fill the basins to spillway level if occurring during periods lasting from one to five days gave the results shown in Table 16. Taking into account that the maximum runoff at Dayton in the 1913 flood was 6.94 inches in 3 days, 7.74 inches in 4 days, and 8.29 inches in 5 days, the wide margin of safety provided by the proposed retarding basins under a great variety of conditions becomes clearly apparent. Since making these calculations, the spillway elevations at Taylorsville and Lockington have been reduced 2 feet, so that in these cases the theoretical maximum flood level referred to in the table would be one or two feet above the adopted spillway level.

Careful study has been given the matter of adjusting the heights of dams and sizes of outlet conduits for the different retarding basins, so as to secure for the system as a whole the most satisfactory and efficient operation with the least expenditure of money and disturbance of vested interests.

SPILLWAYS

Each dam is provided with a large overflow spillway near its top. These spillways probably never will come into use. If a flood should occur so far greater than any on record as to fill the retarding basins to an elevation higher than the spillway crest, the excess water would be discharged over the spillway. In such a case the amount flowing down the channel below the dam would be increased, and the security against damage in the cities below would be correspondingly diminished. The dams and spillways are so designed as to care for a flood twice as great as the greatest on record, just as though such a flood were to be of common occurrence in the future.

Hence, if a storm could occur great enough to fill the retarding basins above the spillway crests, the dams themselves would be protected against any possible damage by the spillways discharging the surplus water. Thus the dams would be perfectly safe against damage, even though there should be damage to lands below from the excess flood water flowing down the channel. But even in this imaginary case, the damage below would be much less than would occur if the dams were not in existence. That is, even in such a case the retarding basins would afford a large measure of protection.

It should be remembered as a cardinal principle that the maximum efficiency of a flood retarding basin is secured when the work is so designed that during the maximum storm to be provided

against, the water in the basin approximately reaches, but does not materially overtop, the spillway. In designing the spillways, it was decided to make them large enough so that with the given storage capacity in the basin, a maximum runoff of 14 inches in depth over the tributary drainage area in 3 days could be taken care of. This is twice the amount of the 1913 flood runoff.

In calculating the discharge over the spillway crest, it was assumed that the maximum level of water reached in the retarding basins under this 14-inch runoff would be about ten feet above the level of the spillway crest. The sum of the storage capacity and the amount discharged through the outlet conduits was subtracted from the total 14-inch runoff to obtain the amount that must be discharged over the spillways. This gave a smaller size for the spillway for the Huffman basin than it seems desirable to use, and therefore it was decided to increase the length of this spillway to 100 feet.

CONSTRUCTION OF EARTH DAMS

The dams themselves are to be built of earth, probably by a hydraulic process, so as to secure an impervious central portion, of the most approved type of construction. The slope of the faces of the dams has been very conservatively fixed.

The level top of the dams will be 25 feet wide. The side slopes will vary, being 2 horizontal to 1 vertical at the top, and 10 horizontal to 1 vertical near the base. At the breaks in the slopes there will be level berms 10 feet wide. These berms will be provided with drains or ditches, leading rain water off to the sides of the dam, so it will not flow directly down the face. Figure 33 indicates a typical cross section, in detail, of the Englewood dam, and a cross section of Stillwater River Valley along the center line of the Englewood dam.

CONSTRUCTION OF OUTLET CONDUITS

The outlet conduits through the dams will be built of massive concrete. The interior surfaces will be carefully finished smooth, so as to offer as little resistance as possible to the flow of the water. The entrance end of the conduits will be rounded with large radius curves, and with no sharp angles whatever, so as to avoid entrance contraction and disturbance. It is assumed that with sufficient care in this regard the entrance coefficient will be unity.

The entrance will be protected from the approach of any possible drift by rows of piers and a continuous boom. At the time of

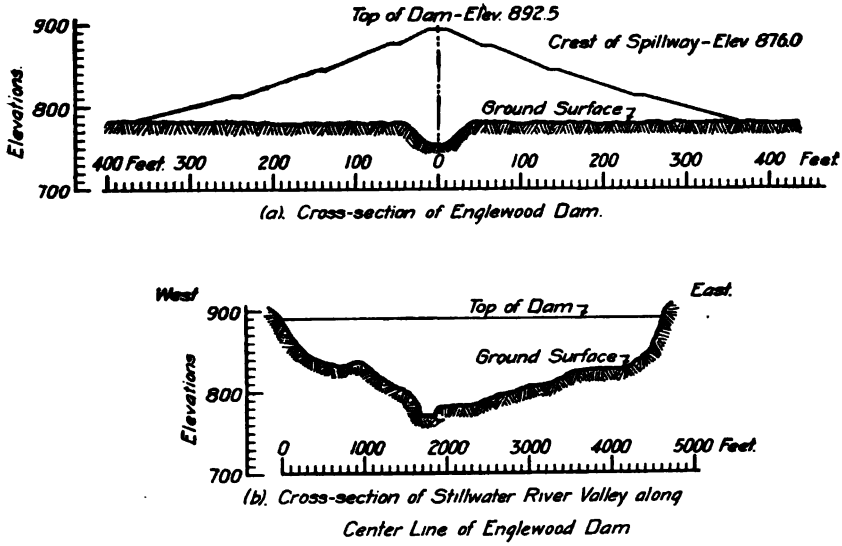


Fig. 33.—(a) Cross section of Englewood dam; (b) Cross section of Stillwater River Valley along the center line of the Englewood dam. These cross sections are typical of the conditions found at the various dam sites.

the occurrence of any considerable flood the entrance to each conduit will be submerged, and therefore free from disturbance by floating drift.

With a high stage in the retarding basins, water will issue from the conduits at a high velocity. It is necessary to protect the channels below the dams from injury by this high velocity, and the outlets of the conduits are so designed that the energy of the water will be dissipated in a standing wave within a concrete channel.

CONSTRUCTION OF SPILLWAYS

The spillways will be built of concrete with rounded crests of such shape as to secure a maximum weir discharge when the water in the basin approaches the assumed maximum level. A channel protected with concrete will extend from the spillway crest to the valley below, so located and constructed as to prevent any possible injury to the dam by descending water, should the spillways ever come into action.

Figure 34 shows the arrangement of the Germantown dam, outlet conduits, and spillway, giving a general plan of the whole and on a larger scale a plan and elevation of the lower end of the outlet

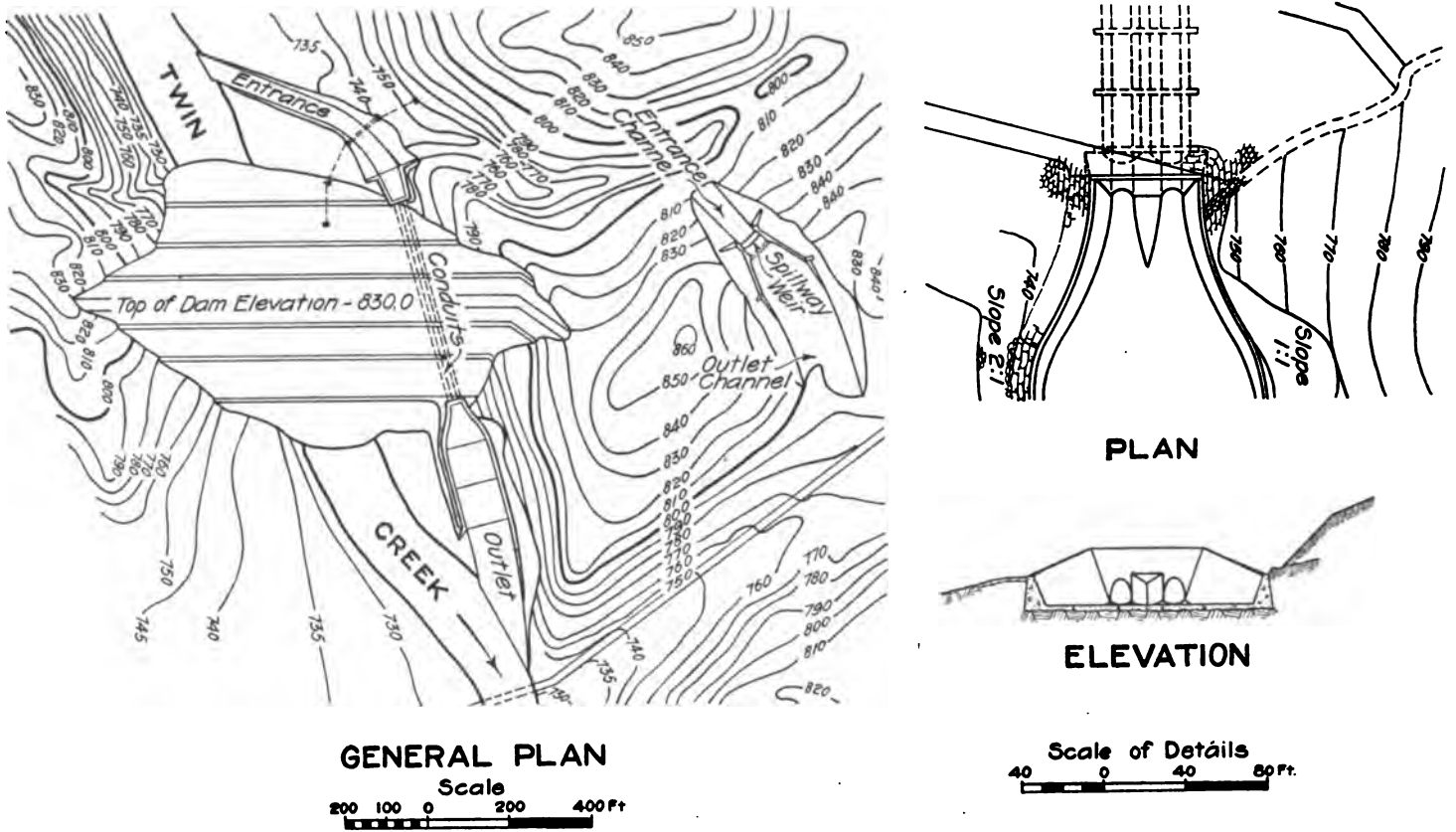


Fig. 84—General plan of Germantown Dam, Outlet Conduits, and Spillway; and enlarged plan and elevation of lower end of Outlet Works.

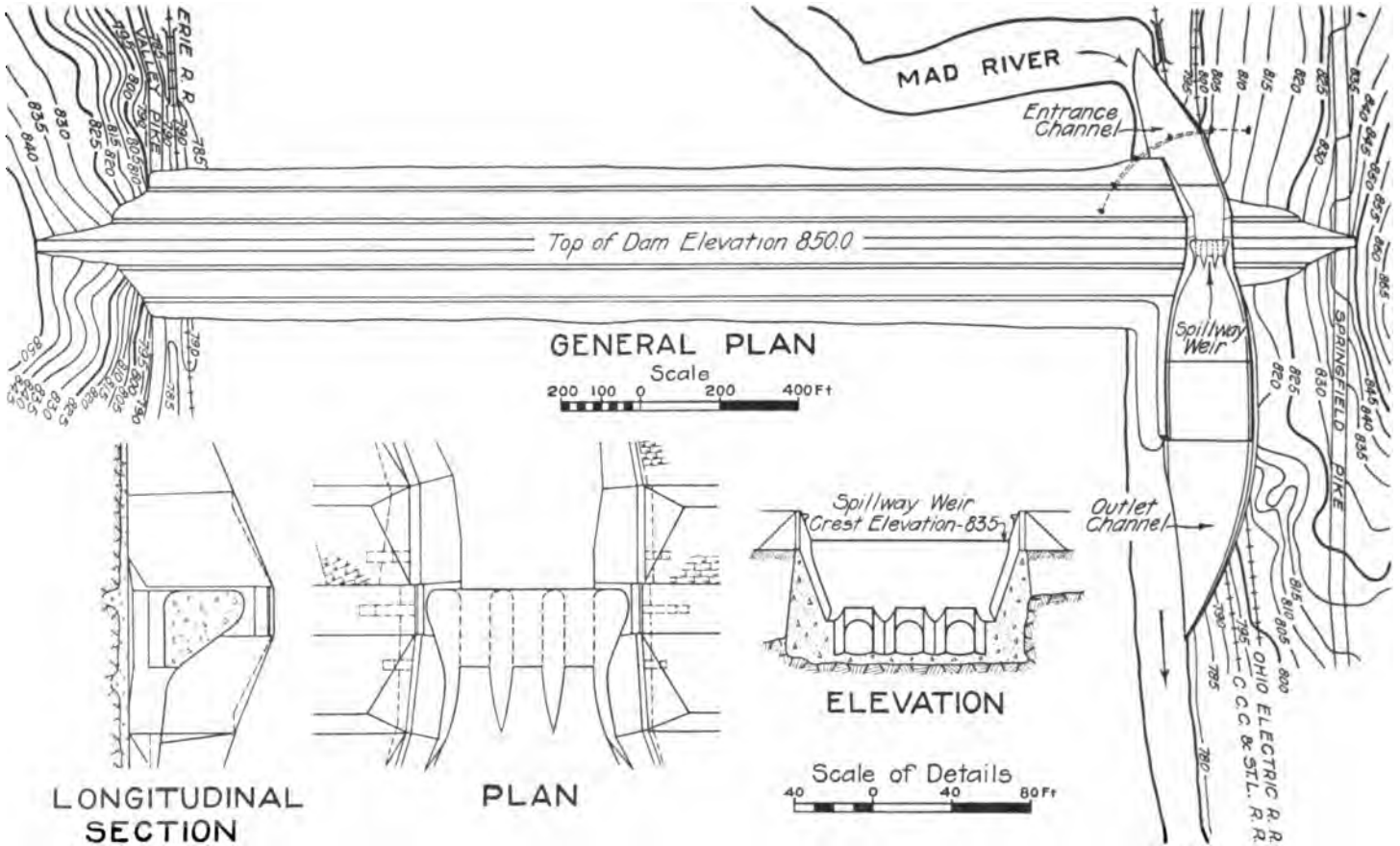


Fig. 35.—General plan of Huffman Dam, Outlet Conduits, and Spillway; and enlarged plan, elevation, and longitudinal section of combined concrete spillway weir and outlet works.

conduits. The earth dam is built across the valley at a narrow place between projecting hills on the north and south sides. The general plan shows the relation of the dam to the contour lines along the sides of the valley, and the level berms on the slopes of the dam.

The concrete outlet conduits through the base of the dam are on solid rock on the north side of the creek bed. The concrete spillway is located in a notch in the hill about 500 feet north of the dam. The detailed plan and elevation of the lower end of the outlet conduits, drawn to a larger scale, show the shape of the cross section of the two equal horse shoe-shaped conduits. They are made parallel, about 40 feet apart, and empty into a single tapering concrete channel leading to the creek bed below the dam.

In the Englewood dam the arrangement is much the same as at Germantown, but at the other three dams the spillways and outlet conduits are combined into one concrete structure. The Huffman dam has been chosen to illustrate this arrangement.

Figure 35 shows a general plan of the Huffman dam, spillway, and outlet conduits with an enlarged plan, elevation, and longitudinal section of the combined concrete spillway and outlet conduits. The construction of this dam will require the relocation of the Springfield Pike, The Ohio Electric Railway, and the C. C. C. & St. L. R. R. on the south side of the valley and of the Valley Pike and the Erie R. R. on the north side.

The concrete spillway weir is located on solid rock near the Mad River channel on the south side of the valley. Through the base of the structure pass the three equal horse shoe-shaped outlet conduits. The entrances to these conduits will be rounded so as to facilitate the flow of water as much as possible; and the conduits empty through carefully tapered channels into a single combined passageway leading back to the river bed.

SUMMARY OF DIMENSIONS OF DAMS AND APPURTENANCES

The important dimensions of the dams and their appurtenances are shown in Table 17.

Table 17.—Dimensions of Dams and Appurtenances

	Germantown Dam	Englewood Dam	Lockington Dam	Taylorsville Dam	Huffman Dam
Average elevation bed of river	723	768	876	759	777
Average elevation valley floor	730	782	885	770	785
Elevation of spillway crest	815	876	938	818	835
Elevation of top of dam	830	892.5	954	837	850
Maximum elevation of water surface for a flood like 1913	805	862	936	815	830
Area submerged in a flood like 1913, acres	2,950	6,350	3,600	9,650	7,300
Maximum amount of water stored in a flood like 1913, acre feet	73,000	209,000	63,000	152,000	124,000
Average depth of water in basin during a flood like 1913, at time of maximum storage, feet	24.8	32.9	17.4	15.7	17.1
Length of crest of dam, feet	1,210	4,660	*6,400	*2,980	*3,340
Thickness of dam at average elevation of valley floor, feet	650	740	410	390	380
Length of outlet conduit, feet	520	725	45	40	40
Number of conduits	2	2	2	4	3
Total sectional area of outlet conduits, square feet	182	214	158	1,116	705
Maximum discharge of conduits in 1913 flood, second-feet	9,340	11,000	8,630	51,300	32,600
Length of spillway crest, feet	55	100	72	132	100
Vertical diameter of conduits, feet	12.3	13.5	10.0	20.5	17.6
Yardage of earth in dams	865,000	4,000,000	1,135,000	1,235,000	1,655,000
Yardage of concrete in dams and appurtenances	20,000	38,000	38,000	47,000	40,000

* Including Spillway Crest.

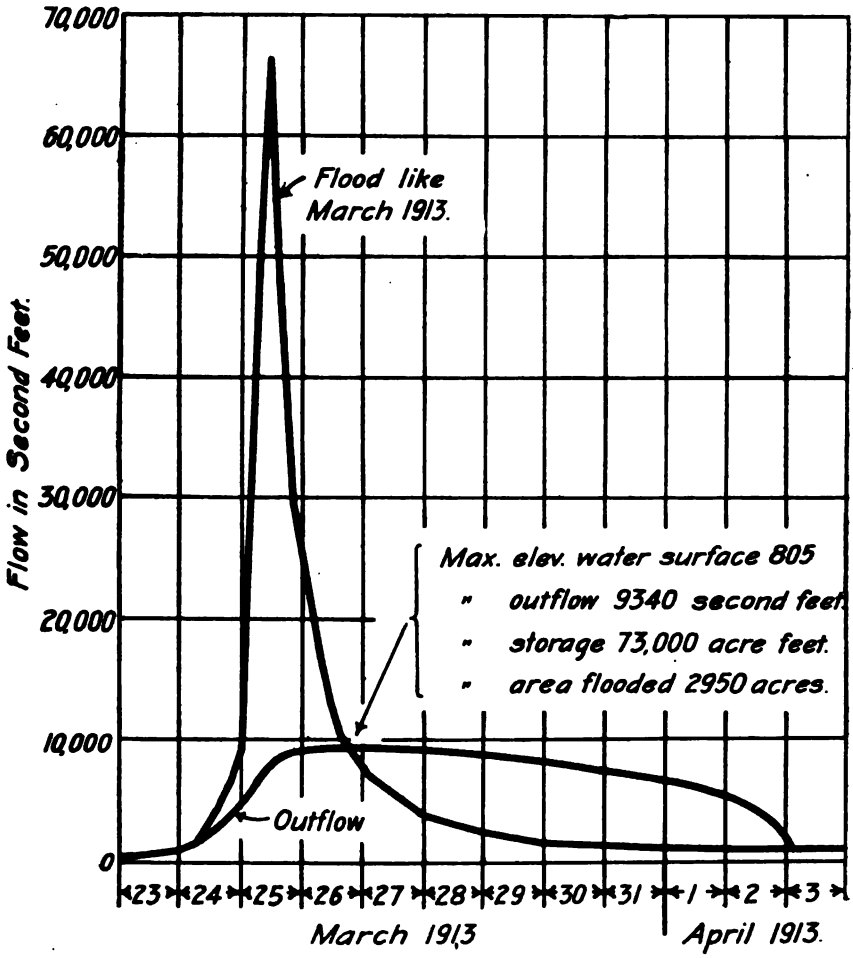


Fig. 36.—Hydrographs showing size of Flood of March, 1913, at Germantown Retarding Basin, as compared with the rate of outflow from the Basin if it had been in existence.

EFFECT OF RETARDING BASIN SYSTEM ON A FLOOD WAVE EQUAL TO THAT OF MARCH, 1913

The curves in Figures 36 to 40 show the effect that the retarding basins would have had if they had been in existence at the time of the 1913 flood. On the diagram for each retarding basin is shown the hydrograph of the 1913 flood as it actually existed, and also a

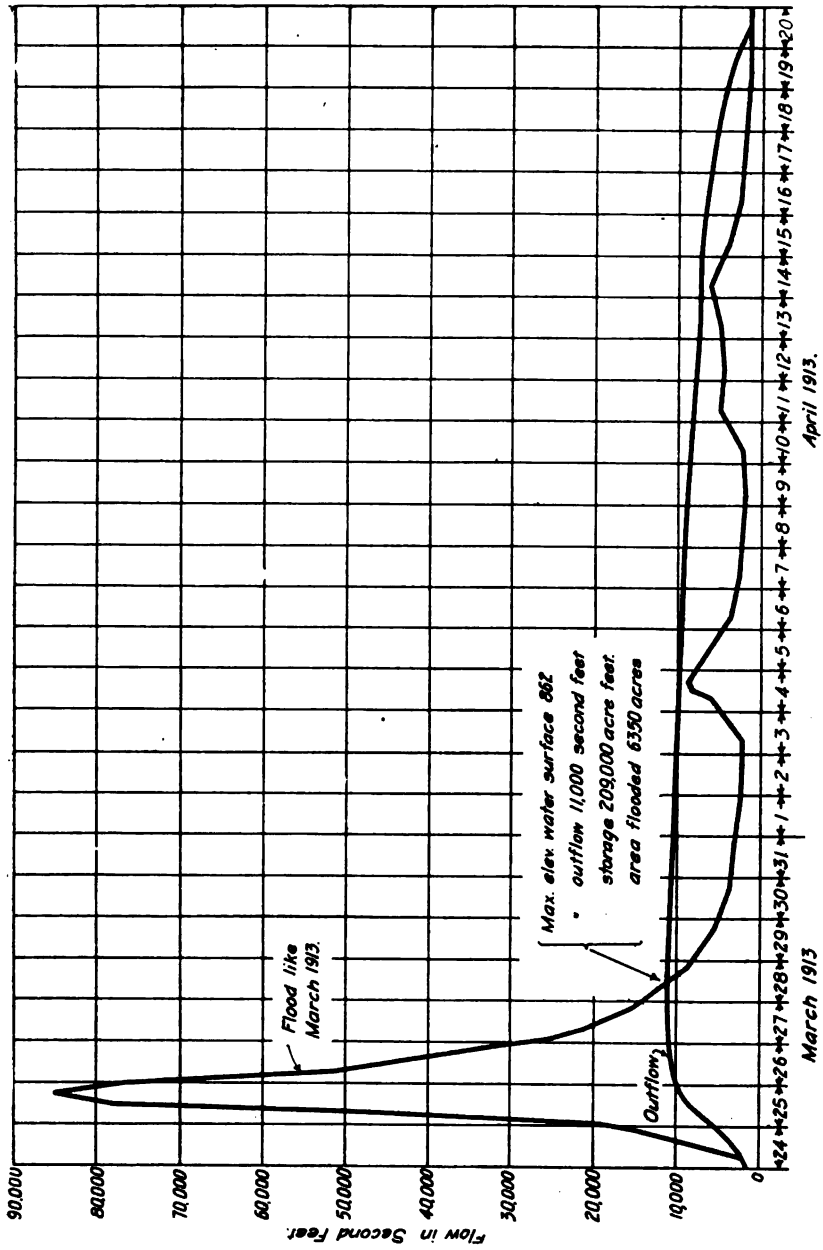


Fig. 37.—Hydrographs showing size of Flood of March, 1913, at Englewood Retarding Basin, as compared with the rate of outflow from the Basin if it had been in existence.

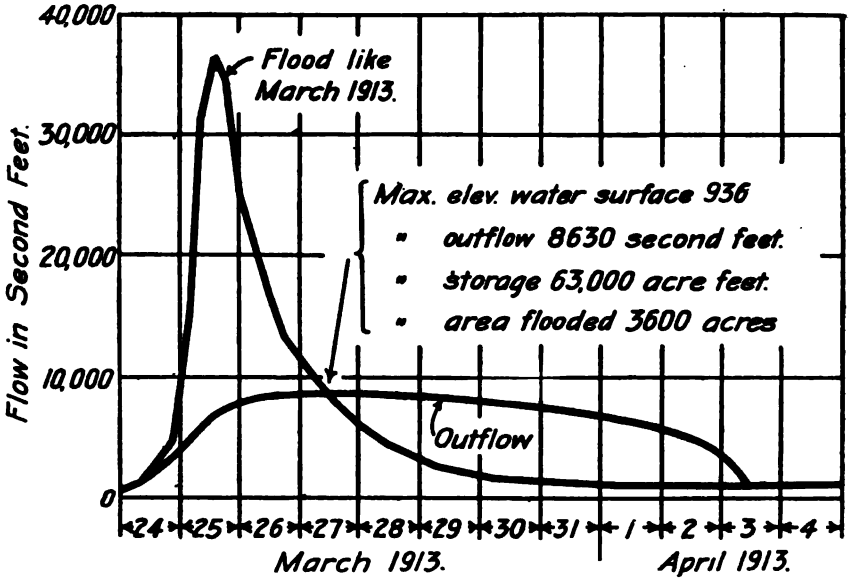


Fig. 38.—Hydrographs showing size of Flood of March, 1913, at Lockington Retarding Basin, as compared with the rate of outflow from the Basin if it had been in existence.

curve to show the flow below the dam which would have occurred had the dam been built. These diagrams show at once to the eye the beneficial effect of the flood retarding basins.

The effect of the system on a flood of the size of that of March, 1913, in reducing the maximum flow in the river at various points below the dams is shown in Table 18.

Table 18.—Maximum Flood Flow at Various Points in the Miami Valley for a Flood Equal to that of March, 1913, with and without the Retarding Basins.

	Without Retarding Basins	With Retarding Basins
	Second feet	Second feet
Piqua	70,000	58,000
Dayton	250,000	105,000
Hamilton	354,000	200,000

The further protection from floods which is not secured by means of the retarding basins is effected by channel improvements within the cities.

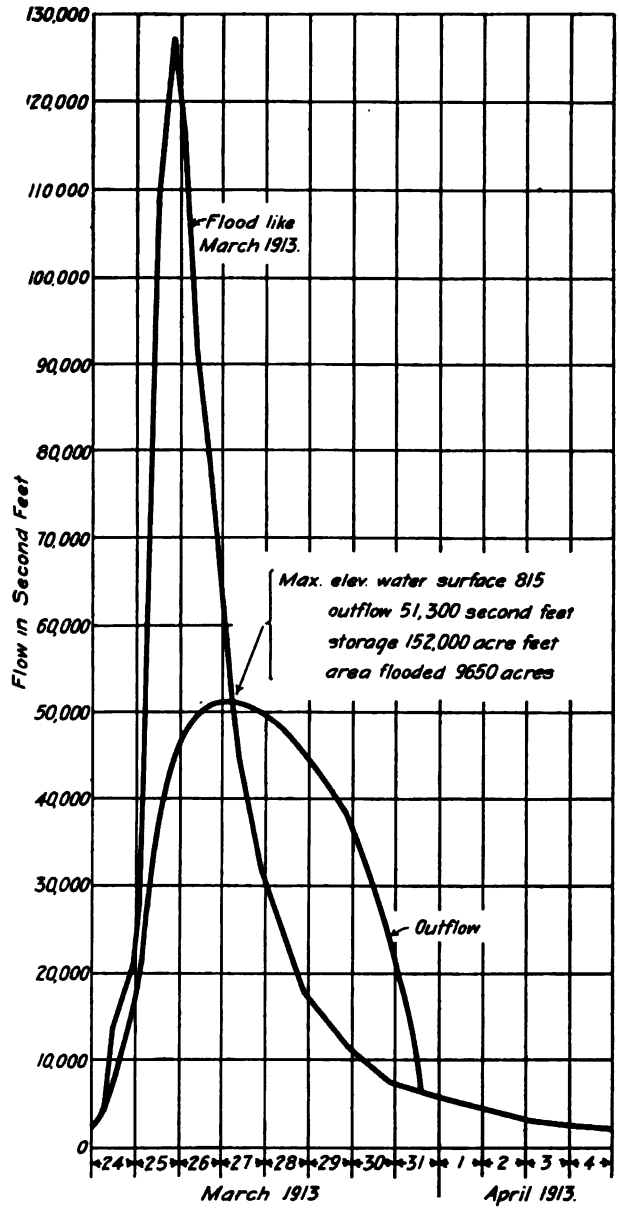


Fig. 39.—Hydrographs showing size of Flood of March, 1913, at Taylorsville Retarding Basin, as compared with the rate of outflow from the Basin if it had been in existence.

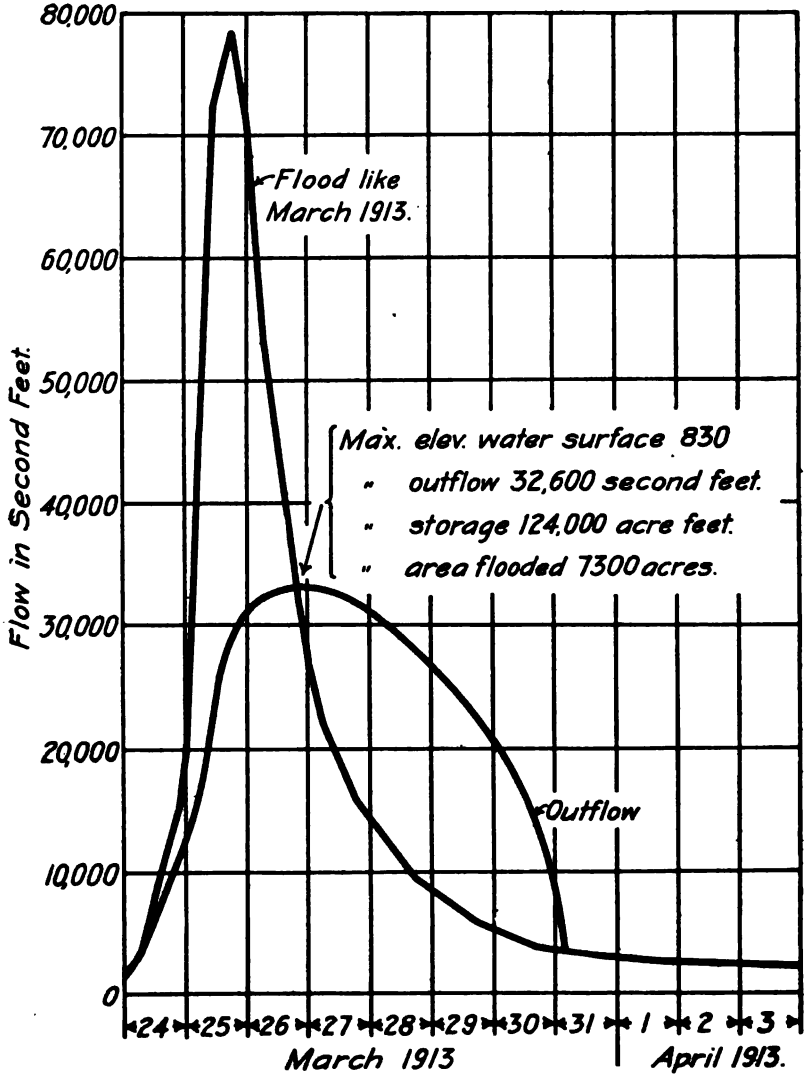


Fig. 40.—Hydrographs showing size of Flood of March, 1913, at Huffman Retarding Basin, as compared with the rate of outflow from the Basin if it had been in existence.

FREQUENCY OF FLOODING LANDS IN RETARDING BASINS

In order that definite knowledge may be available as to the effect of the construction of the retarding basins on any particular tract of land, a very careful and thorough investigation has been made as to the flooding which would have occurred if the basins had been in operation during recent years. The U. S. Weather Bureau has recorded daily gage heights of the Miami River at Dayton for the past 23 years. Our estimates, based on these Government records, when used in connection with the topographic maps, show the elevation to which the water would have risen on any given tract of land in each of the basins if they had been in existence during each flood which has occurred in the past 23 years. The bulk of the results of this study and the difficulty of representing them in any simple and compact form prevent publishing them in detail here, but the facts as to any particular tract of land are available for the use of any interested person.

A somewhat similar condition exists with respect to the physical data given in Part I of this report, and the development of the plan of improvement as set forth in the preceding pages. Only the most salient and pertinent facts have been presented here. The full details of the investigations and studies are available for publication in a series of volumes forming a complete technical report on the project.

PART III

STATEMENT OF THE PLAN

PART III

STATEMENT OF THE PLAN

DESCRIPTION OF THE PLAN RECOMMENDED TO THE BOARD OF DIRECTORS OF THE MIAMI CONSERVANCY DISTRICT FOR ADOPTION AS THE OFFICIAL PLAN OF THE DISTRICT

INTRODUCTORY

General

This plan provides for five retarding basins for reducing the flood flow of the Miami River and its principal tributaries, supplemented by local channel improvements through the various cities, all to be constructed in accordance with the plans shown in the accompanying exhibits, and in accordance with the specifications contained in Part V of this Report.

Descriptions of lands that may be damaged and lands that may be benefited by the proposed improvements are given in Part IV. Estimates of quantities and cost are given in Part VI.

The following exhibits, containing 408 drawings (not published in a form available for general distribution), are included as a part of the Plan:

List of Exhibits

Exhibit Numbers

1. General Maps of the District. (17 sheets)
2. Drawings showing Dams and Appurtenances, and Incidental Works. (20 sheets)
3. Drawings relating to Highways and Railroads and other Public Utilities. (63 sheets)
4. Topographic Maps of the Retarding Basins. (34 sheets)
5. Property Maps of the Retarding Basins. (38 sheets)
6. Standard Designs for Local Protection. (2 sheets)
7. Maps showing Local Protection at Piqua. (10 sheets)
8. Maps showing Local Protection at Troy. (17 sheets)
9. Maps showing Local Protection at Dayton. (28 sheets)
10. Maps showing Local Protection at West Carrollton. (4 sheets)
11. Maps showing Local Protection at Miamisburg. (4 sheets)
12. Maps showing Local Protection at Chautauqua. (2 sheets)
13. Maps showing Local Protection at Franklin. (5 sheets)
14. Maps showing Local Protection at Middletown. (10 sheets)
15. Maps showing Local Protection at Hamilton. (15 sheets)
16. Topographic Maps outside of Retarding Basins. (63 sheets)
17. Property Maps outside of Retarding Basins. (76 sheets)

List of Abbreviations

Wherever standard abbreviations are used, they have the meanings customarily assigned to them according to the context; and wherever, because of limited space or otherwise, especially on maps or in tabulations, the following abbreviations have been used, they have the meanings here given:

A. or ac., for acre, acres.
A. ft. or ac. ft., for acre feet.
ac. ft. /hr. for acre feet per hour.
Bn. for Barn.
B. for brick building.
1 B. or 1 S. B. for one-story brick building.
2 B. or 2 S. B. for two-story brick building.
3 B. or 3 S. B. for three-story brick building.
bot. for bottom.
cap. for capacity.
chan. for channel
ctrs. for centers, or center to center.
dia. or diam. for diameter.
dis. or disch. for discharge.
F. for frame building.
1 F. or 1 S. F. for one-story frame building.
2 F. or 2 S. F. for two-story frame building.
3 F. or 3 S. F. for three-story frame building.
F. L. for flow line (sewer invert).
F. L. obs. for observed flow line.
H. W. for high water, or high water mark.

H. W. M. for high water mark.
lin. for linear.
L. W. for low water, or low water mark.
M.R's for Miami River Survey.
obs. for observed.
O. L. for Out Lot.
res. for reservoir or retarding basin.
R. O. W. for right of way
San. for sanitary.
Sl. Stk. for slope stake.
Spwy. for spillway.
top. for topographic
trib. for tributary.
M. & E. Canal for Miami and Erie Canal.
B. & O. S. W. R. R. Co. for The Baltimore and Ohio Southwestern Railroad Company.
C. & O. Ry. Co. for The Chesapeake and Ohio Railway Company of Indiana.
C. C. C. & St. L. Ry. Co. for The Cleveland, Cincinnati, Chicago and St. Louis Railway Company.
C. H. & D. Ry. Co. for The Cincinnati, Hamilton and Dayton Railway Company (Now in the hands of the Receivers, Judson Harmon and Rufus B. Smith, by appointment in the United States District Court for the Southern District of Ohio.); and operating what was formerly:
C. & D. Ry. Co., for The Cincinnati and Dayton Railway Company.
C. I. & W. Ry. Co. for The Cincinnati, Indianapolis and Western Railway Company.
C. L. & N. Ry. Co. for The Cincinnati, Lebanon and Northern Railway Company; and operating:
D. L. & C. R. R. & T. Co. for The Dayton, Lebanon and Cincinnati Railroad and Terminal Company.
C. N. R. R. Co. for The Cincinnati Northern Railroad Company.
P. C. C. & St. L. Ry. Co. for The Pittsburgh, Cincinnati, Chicago and St. Louis Railway Company.
Nypano R. R. Co. (Erie R. R. Co.) for The Nypano Railroad Company (Erie Railroad Company).
C. L. & A. El. R. R. Co. for The Cincinnati, Lawrenceburg and Aurora Electric Street Railroad Company.
D. & T. El. Ry. Co. for The Dayton and Troy Electric Railway Company.
D. C. & P. Tr. Co. for The Dayton, Covington and Piqua Traction Company.
D. S. & X. S. Ry. Co. for The Dayton, Springfield and Xenia Southern Railway Company.
L. & F. Tr. Co. for The Lebanon and Franklin Traction Company.
M. & L. Ry. Co. for The Minster and Loramie Railway Company.
O. E. Ry. Co. for The Ohio Electric Railway Company; and operating:
C. D. & T. Tr. Co. for The Cincinnati, Dayton and Toledo Traction Company; and operating also what was formerly The Dayton, Springfield and Urbana Electric Railway Company.
Ohio Tr. Co. for The Ohio Traction Company; and operating:
C. & H. Tr. Co. for The Cincinnati and Hamilton Traction Company.
S. T. & P. Ry. Co. for The Springfield, Troy and Piqua Railway Company.
W. O. R. R. Co. for The Western Ohio Railroad Company.

Adaptation of Details of Plan to Conditions

In order to anticipate underground conditions, and to be able to outline the Plan in greater detail, numerous soil borings have been made at all of the dam sites. The rock surface on which the spillways and conduits will be placed varies from point to point. While the borings have indicated the location of rock with sufficient accuracy to enable plans and estimates to be made, yet there inevitably will be minor variations in the underground rock surfaces between the points at which borings are taken. In the carrying out of the Plan, it will be necessary continually to adapt the work to the detail configuration of the rock surfaces, and such adaptation will require minor increases and decreases in quantities, and modification of detail designs and position of structures founded upon the rock, and the works affected thereby. The Official Plan does not attempt to forecast and define these detail conditions beyond reasonable limits, and such adjustments to actual detail conditions are understood to be within the limits of the Official Plan, and are not to be considered as changes in or additions to the Official Plan. The same is true concerning such minor modifications as changes in depth and side slopes of cutoff trenches made necessary by the character of the earth encountered from time to time on the work; concerning variations made necessary in order to prevent interference with water or other underground pipes encountered in channel improvements; and concerning other conditions which become apparent on the various parts of the work as construction, or preparation for construction, progresses.

RETARDING BASINS

General Description

The retarding basins will be formed by the construction of massive earth dams across the valleys of the streams, for the purpose of retarding flood flows. Topographic maps of the retarding basins are included in Exhibit 4, and property maps of the same territory in Exhibit 5. Drawings showing the details of locations, plans, sections, profiles, and other data concerning the dams and outlet works are included in Exhibit 2 of this report. General maps of the district indicating the locations of the retarding basins are included in Exhibit 1.

The Dams

The dams will be constructed of selected earth, carefully placed and thoroughly compacted in such manner as to form practically impervious structures. The surface of the ground on which the dams are to be constructed will be stripped of organic matter and of all material which in any way might be detrimental to the structures, and will be roughened so as to result in a thorough bond with the material in the dams. In all cases where the underlying material is not relatively impervious, cutoff trenches will be excavated underneath the impervious central portion of the dam, of sufficient depth, width, and length so that, when filled with impervious material, the flow of water through the ground underlying the dam will be prevented.

In each case the top, which has a width of 25 feet, will be used as a roadway. The outer surfaces will be covered with fertile soil, and planted to grass. Rainfall on the slopes will be collected in gutters on the berms, carried to other paved gutters on the slopes, and conveyed to the valley below without erosion of the surface of the dams. The lower portions of the slopes will be protected by quantities of stone secured from the spillway and conduit excavations.

Outlet Works and Spillways

Conduits, which will allow the usual flow of the streams to pass unimpeded, will be constructed on rock foundations through the bases of the dams. Concrete spillways, with their crests fifteen feet or more below the tops of the dams, also to be constructed on rock foundations, will pass safely all excess water in case of a flood twice as great as that of 1913.

It is not anticipated that these spillways ever will come into use, since to bring them into action would require a greater storm than ever has been recorded in this part of the United States. They are added as an ultimate factor of safety, and would provide security in case of a flood exceeding anything recorded in the history of the country.

Two general types of outlet works are provided. At the Taylorsville, Huffman, and Lockington dams the spillway and outlet conduits are united in single concrete structures. At the Englewood and Germantown dams the spillways and conduits are entirely separated. The details of the various structures are given in the descriptions of the several retarding basins.

A short distance upstream from the entrance to the conduits, rows of concrete piers will prevent large masses of timber from

floating to the conduit entrances. Booms, anchored to massive concrete piers, also will be constructed, to catch material drifting on the surface of the water and to prevent it from being carried into the conduits. The stream beds, and the toes and slopes of the embankments of the dams, will be paved at and near the entrance to the conduits in such manner as to provide ample protection against all erosive action.

Below the conduits, broad channels with concrete floors and side walls, and wide enough to allow the water to spread out very quickly as it issues from the outlets, will extend down stream for several hundred feet, finally connecting, either directly or through artificial channels, with the river channels below. The bottoms of these channels will be below the water level in the stream. As a result, the water leaving the conduits at high velocities will meet comparatively still water in the larger channel below. The constant tendency of the swiftly moving water to push back that which is comparatively still will cause a wall of water to pile up to a height of 3 to 10 feet or more, depending on the volume and velocity of the water coming from the conduits, and upon the depth of the water below. This piling up of the water is known in engineering practice as the "standing wave," or as the "hydraulic jump." It is a most effective means for destroying the velocity of the water emerging from the conduits.

Highways

Several highways affected by the construction of retarding basins will be relocated or raised to avoid interruption and inconvenience to travel. These changes are outlined in detail in the descriptions of the plans for the several retarding basins. In each case the changes will be made as a part of the execution of the Plan, and the cost is included as a part of the cost of the Plan. Drawings relating to highways in the retarding basins are included in Exhibit 3.

Public Service Properties

In several cases railroads, electric traction lines, telephone, and telegraph lines, and other public service properties will be affected by the execution of the Plan. These cases are outlined in detail in the descriptions of the plans for the several retarding basins. The estimated amount of damages, and the estimated cost of such changes and relocations as will be necessary are included in the estimates as a part of the cost of the execution of the Plan. The work of making the necessary changes, however, is not included in

the Plan, as the owners of the public utilities, except as otherwise specified, will be allowed to make such changes and relocations to whatever extent and by whatever means may be advisable, or they may assume the risk of future flooding instead of making the changes. Maps and drawings relating to Public Service properties in the retarding basins are included in Exhibit 3.

Lands Within the Basins

A flood 40 per cent greater than that of 1913 would cover about 35,600 acres of land in the 5 retarding basins. Of this area, about 20,500 acres were actually flooded in 1913, and a larger area would, of course, have been flooded by a flood 40 per cent greater; so that less than 15,000 acres additional would be flooded by the construction of the dams, in case such a greater storm should ever occur.

The right to flood this land will be acquired by the purchase of the land or by obtaining easements. The construction of the dams will not result in removing from agricultural use more than a few hundred acres of land at and near the sites of the dams.

GERMANTOWN RETARDING BASIN

General

A retarding basin will be formed by the construction of a dam across the valley of Twin Creek, in Montgomery County, at a location about two miles northwest of Germantown.

In case of a storm like that of March, 1913, this basin would reduce the flood flow from about 66,000 second feet to about 9,300 second feet. Such a storm would fill the basin to elevation 805, at which stage 73,000 acre feet of water would be held in the basin, covering 2,950 acres of land. Since 2,045 acres were actually flooded in March, 1913, the additional area that would be flooded by the building of the dam would be 905 acres. In 7½ days after reaching its maximum stage during this storm, the basin would be empty.

The Dam

The dam will occupy parts of the NE ¼ of Sec. 10 and the NW ¼ of Sec. 11, T 3 N, R 4 E, of the 1st Principal Meridian. The center line of the dam will be 1210 feet long, extending from a point in the SE ¼ of the NE ¼ of Sec. 10, T 3 N, R 4 E, 1st P. M.; northerly to a point in the NW ¼ of the NW ¼ of Sec. 11, T 3 N, R 4 E, 1st P. M.; as indicated on the map, Exhibit 1, Sheet 8. A cross section of the dam is shown in Exhibit No. 2, Sheet No. 2.

The top will be at elevation 830. At elevation 730, which is the average surface elevation of the valley, the dam will be 650 feet thick.

The Spillway

The spillway will be constructed in a depression in the hill about 500 feet north of the north end of the dam. The crest of the spillway will be at elevation 815, and will have a total length in the clear of 55 feet. This spillway will consist of a concrete overflow weir and end walls, and below the weir, of an outlet channel with a concrete floor and side walls extending for a considerable distance from the weir. The channel will be gradually widened, so as to spread the water and thus decrease its velocity. Should any water ever flow over the weir and through the discharge channel, it will be conducted to the river at a considerable distance below the downstream toe of the dam, so that the latter will not be endangered.

The Outlet Works

In the rock ledge on the north side of the valley, an outlet will be constructed through the dam to provide a free passage for the water. This will consist of two conduits of equal dimensions. The conduits and appurtenances, which are designed with large factors of safety, will be constructed of concrete, proportioned and shaped to insure ample strength, and will be founded upon an adequate and carefully prepared foundation. Where necessary, they will be suitably reinforced with steel to confine the construction stresses in the concrete within conservative limits.

Collars of concrete, extending several feet into the surrounding earth or rock, will be placed around the conduits at intervals, to prevent seepage along the outer surface. The inside of the conduits will be lined with a layer of very rich, dense, and hard concrete. The inverts, and the sides for a short distance above the inverts, will be lined with best quality vitrified brick in order that this part of the lining may be renewed, should it become worn. The two equal conduits are provided so that either may be closed temporarily during the low water season, for inspection or repairs. The conduits will be 520 feet long, and the area of each will be 91 square feet.

Highways

Above and near the dam the following highway changes will be necessary.

A road about 1½ miles in length, designated on the Drawings as Road No. 1, will be constructed from a point on an existing road

located in the SW ¼ of Sec. 10, T 3 N, R 4 E, 1st P. M., to a point on an existing road located in the NW ¼ of Sec. 11, T 3 N, R 4 E, 1st P. M., and will cross the valley along the top of the Germantown Dam. This work will include the construction of a steel bridge over the spillway of the Germantown Dam; the construction of such bridge abutments, culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 1, 6, 7, and 8.

The existing road located along the line between T 3 N, and T 4 N, will be raised to elevation 765 for a distance of about 500 feet west of, and about a fourth of a mile east of the center line of the existing bridge over Twin Creek, located on the township line between the NE ¼ of Sec. 4, T 3 N, R 4 E, 1st P. M., and the SE ¼ of Sec. 33, T 4 N, R 4 E, 1st P. M. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required, and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 2, are shown in Exhibit 3, Sheets 1 and 9.

That part of the existing road along the north bank of Twin Creek in Sec. 10 and Sec. 11, T 3 N, R 4 E, 1st P. M., which lies within the area required for the construction of the dam and its appurtenances will be abandoned, the abandonment to become effective upon the execution of the contract for the construction of the dam.

Telegraph Lines and Telephone Lines

The existing pole line along the highway located on the township line between Sec. 4, T 3 N, R 4 E, 1st P. M., and Sec. 33, T 4 N, R 4 E, 1st P. M., and thence running north along the highway located on the line between Sec. 33 and Sec. 34, T 4 N, R 4 E, 1st P. M., can readily be raised so that the wires of the line will not be lower than elevation 790. This change would necessitate the reconstruction of the existing line on the present location for a distance of about half a mile.

ENGLEWOOD RETARDING BASIN

General

A retarding basin will be formed by the construction of a dam across the valley of the Stillwater River, in Montgomery County, at a location about one mile southeast of Englewood.

In case of a storm like that of March, 1913, this basin would reduce the maximum flood flow from about 85,400 second feet to about 11,000 second feet. Such a storm would fill the basin to elevation 862, at which stage 209,000 acre feet of water would be held, covering 6350 acres of land. Since 3285 acres were actually flooded in March, 1913, the additional area flooded by the building of the dam would be 3065 acres. In 23 days after reaching its maximum stage during this storm, the basin would be empty.

The Dam

The dam will occupy parts of all four quarters of Sec. 23, T 5 N, R 5 E, of the 1st Principal Meridian. The center line of the dam will be 4660 feet long, extending from a point in the NW ¼ of the SW ¼ of Sec. 23, T 5 N, R 5 E, 1st P. M.; northeasterly to a point in the NE ¼ of the NE ¼ of Sec. 23, T 5 N, R 5 E, 1st P. M.; as indicated on the map, Exhibit 1, Sheet 10. A cross section of the dam is shown on Exhibit 2, Sheet 6. The top will be at elevation 892.5. At elevation 782, which is the average surface elevation of the valley, the dam will be 740 feet thick.

The Spillway

In the south end of the dam, a spillway 100 feet long in the clear will be constructed, with its crest at elevation 876. It will consist of a concrete overflow weir and end walls, and below the weir, of an outlet channel with a concrete floor and side walls extending for a considerable distance from the weir. From the point where the concrete floor ends, a channel will be excavated to rock and a concrete wall built along the side of the channel nearest the dam, extending to a natural gorge leading away from the dam. This wall will be carried about six feet into rock, so that if by any possible chance the rock bed of the spillway channel should be worn away by the flow of water, the wall would not fail until the channel in the rock had worn to sufficient depth to carry the entire flow with complete safety below the ground surface, in which case the wall would be wholly unnecessary.

The Outlet Works

In the rock ledge on the west side of the valley an outlet will be constructed through the dam to provide a free passage for the water. This will consist of two conduits of equal dimensions. The conduits and appurtenances, which are designed with large factors of safety, will be constructed of concrete, proportioned and shaped to insure ample strength, and will be founded upon an adequate

and carefully prepared foundation. Where necessary, they will be suitably reinforced with steel to confine the construction stresses in the concrete within conservative limits.

Collars of concrete, extending several feet into the surrounding earth or rock, will be placed around the conduits at intervals, to prevent seepage along the outer surface. The conduits will be lined with a layer of very rich, dense, and hard concrete. The inverts, and the sides for a short distance above the inverts, will be lined with best quality vitrified brick, in order that this part of the lining may be renewed, should it become worn. The two equal conduits are provided so that either may be closed temporarily during the low water season, for inspection or repairs. The conduits will be 725 feet long and the area of each will be 107 square feet.

Railroads

The Peoria and Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis Railway, The Delphos Division of the Cincinnati, Hamilton & Dayton Railroad, and the Dayton, Covington & Piqua Electric Railway are each, at one or more points, below the spillway elevation of the Englewood Dam.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY

The Cleveland, Cincinnati, Chicago & St. Louis Railway crosses the Stillwater River valley just southeast of Ludlow Falls. About 6000 feet of this track, including the bridge, are 15 feet or less below the spillway elevation, the bridge being at the lowest point. To raise this track and bridge to the spillway elevation on the present location is not practicable. A new location has been made by laying a tangent, parallel to the present tangent across the bridge, far enough south to allow the new construction to be made without interrupting traffic. The ends of the tangent will be connected to the present track by using the same degree of curve as is now being used on the present track. The new grade will be level. No cities or villages will be affected by this change.

THE CINCINNATI, HAMILTON & DAYTON RAILROAD

The Delphos Division of the Cincinnati, Hamilton & Dayton Railroad, at its crossing of the Stillwater valley between Ludlow Falls and Pleasant Hill, is below spillway elevation 32 feet or less for a total distance of about 2 miles, the bridge over the river being about 0.6 mile south of the north end of this stretch. It is not practicable to raise this track and bridge very much on the present location. A new location is practicable about 200 feet west of the

present track. The new location has easier grades and better alignment than the present track and is about the same length. No cities or villages will be affected by this change.

THE DAYTON, COVINGTON & PIQUA ELECTRIC RAILWAY

The Dayton, Covington & Piqua Electric Railway, at the crossing of Pigeye Creek near the north line of Montgomery County, is below spillway elevation 32 feet or less for a total distance of about half a mile. Also at the crossing of the Stillwater valley between Ludlow Falls and Pleasant Hill it is below spillway elevation 32 feet or less for a distance of about 1.3 miles, the bridge across Stillwater River being about 0.3 mile south of the north end of this stretch.

The track at Pigeye Creek can be raised on the present location by shifting the present track to one side during construction. The change across the Stillwater valley probably can best be made by a new location for a greater part of the way slightly west of the present track. No cities or villages will be affected by these changes.

Highways

Above and near the dam the following highway changes will be necessary:

The existing road located in the SW ¼ of Sec. 23, T 5 N, R 5 E, 1st P. M., will be lowered for a distance of about 800 feet near the west end of the Englewood Dam. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required, and the surfacing of the new sub-grade with water-bound macadam. A location map and profile of this revised road, designated on the Drawings as Road No. 3, are shown in Exhibit 3, Sheets 2 and 10.

A road about 1½ miles in length, designated on the Drawings as Road No. 4, will be constructed from a point on Road No. 3, located in the W ½ of Sec. 23, T 5 N, R 5 E, 1st P. M., to a point on an existing road located in the E ½ of Sec. 14, T 5 N, R 5 E, 1st P. M., and will cross the valley along the top of the Englewood Dam. This work will include the construction of a single-span steel bridge over the spillway of the Englewood Dam, a steel approach span, and the necessary bridge piers and abutments; the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with rolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 2, 11, 12, and 13.

A road about three-fourths of a mile in length, designated on the Drawings as Road No. 5, will be constructed from a point on an ex-

isting road located in the E ½ of Sec. 23, T 5 N, R 5 E, 1st P. M., to a point on Road No. 4 located near the S E corner of Sec. 14, T 5 N, R 5 E, 1st P. M. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 2 and 14.

The existing road crossing the Stillwater River valley in Sec. 10 and Sec. 11, T 5 N, R 5 E, 1st P. M., will be raised to elevation 825, where it crosses the valley. This revision will be about three-fourths of a mile in length. It will include the raising of the existing two-span steel bridge over the Stillwater River to the elevation indicated; the reconstruction of the existing bridge pier and abutments; the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new subgrade with unrolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 6, are shown in Exhibit 3, Sheets 2, 15, and 16.

The course of the existing road crossing the Stillwater River in the W ½ of Sec. 35, T 6 N, R 5 E, 1st P. M., will be changed from a point on the line between Sec. 27 and Sec. 34, T 6 N, R 5 E, 1st P. M., to a point in the W ½ of Sec. 35, T 6 N, R 5 E, 1st P. M. This revision, designated on the Drawings as Road No. 7, will be about 1¼ miles in length. The work will include raising an existing single-span steel bridge to the elevation indicated, and the reconstruction of the bridge abutments; removing an existing bridge consisting of two steel spans, transporting it about half a mile, reerecting it at the location designated, and constructing the necessary bridge pier and abutments; the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 2, 17, and 18.

That portion of the existing north and south road located in Sec. 23, T 5 N, R 5 E, 1st P. M., which lies within the area required for the construction of the dam and its appurtenances will be abandoned, the abandonment to become effective upon the execution of the contract for the construction of the dam.

Telegraph Lines and Telephone Lines

The existing pole lines crossing the Stillwater River along the National Road in Sec. 15, T 5 N, R 5 E, 1st P. M., can be removed from all danger of flooding by reconstructing the lines so as to

cross the valley along the top of the Englewood Dam. These changes would necessitate the construction of about 2½ miles of double line, and are entirely feasible. The length of the new line would be about 1 mile greater than the length of each of the existing lines that it would replace.

The existing pole lines crossing the Stillwater River in Sec. 35, T 6 N, R 5 E, 1st P. M., can be raised so that the wires will not be lower than elevation 870. These changes would necessitate the reconstruction or relocation of one or more of the lines for a distance of about 2½ miles, and is entirely feasible. The length of the reconstructed lines would not differ materially from the length of the existing lines.

The existing pole lines crossing the Stillwater River in the N ½ of Sec. 21, T 6 N, R 5 E, 1st P. M., can readily be raised so that the wires of the lines will be not lower than elevation 870. This change would necessitate the reconstruction of the existing lines on the present location for a distance of about a fourth of a mile.

LOCKINGTON RETARDING BASIN

General

A retarding basin will be formed by the construction of a dam across the valley of Loramie Creek, in Shelby County, at a location about half a mile northwest of Lockington.

In case of a storm like that of March, 1913, this basin would reduce the flood flow from about 33,000 second feet to about 8,630 second feet. Such a storm would fill the basin to elevation 936, at which stage 63,000 acre feet of water would be held in the basin, covering 3,600 acres of land. Since 3,240 acres were actually flooded in March, 1913, the additional area that would be flooded by the building of the dam would be 360 acres. In 7 days after reaching its maximum stage during this storm, the basin would be empty.

The Dam

The dam will occupy parts of the SW ¼ of Sec. 20, the NW ¼ of Sec. 29, the NE and NW quarters of Sec. 30, and the SE and SW quarters of Sec. 19, T 7 N, R 6 E, of the 1st Principal Meridian. The center line of the dam will be 6400 feet long, extending from a point in the SW ¼ of the SW ¼ of Sec. 19, T 7 N, R 6 E, 1st P. M.; easterly to a point in the SE ¼ of the SW ¼ of Sec. 20, T 7 N, R 6 E, 1st P. M.; as indicated on the map, Exhibit 1, Sheets 13 and 14. A cross section of the dam is shown on Exhibit 2, Sheet 10. The top will be at an elevation 954. At elevation 885, which is the average surface elevation of the valley, the dam will be 410 feet thick.

The Outlet Works and Spillway

The outlet works and spillway will be combined in one structure and will be built in the dam about 400 feet east of the present river bed. This structure will provide an open channel through the dam, except along the center line of the dam, where a concrete waste weir will be constructed, 72 feet long in the clear and with its crest at elevation 938. Through the base of the waste weir two conduits of equal size will be constructed to provide a free passage for the water. The conduits will be lined with very rich, dense, and hard concrete. The inverts, and the sides for a short distance above the inverts, will be lined with best quality vitrified brick, in order that this part of the lining may be renewed, should it become worn. The two equal conduits are provided so that either may be closed temporarily during the low water season, for inspection or repairs. The conduits will be 45 feet long and the area of each will be 79 square feet. If the spillway ever should come into use, the channel that is provided for the conduits will be adequate to convey the water to the river below the dam.

Railroads

The main line of the Cleveland, Cincinnati, Chicago & St. Louis Railway, from Cleveland to St. Louis, is the only railroad that will be affected by the operation of the proposed Lockington Basin. Beginning at a point on this line about 1700 feet west of the village of Dawson, and extending westwardly to the west end of the bridge over Loramie Creek a total distance of about 1500 feet, the track is 3 feet or less below the spillway elevation. It can readily be raised on the present location without seriously interfering with traffic. No cities or villages will be affected by the change.

Highways

Above and near the dam the following highway changes will be necessary. A road about 1½ miles in length, designated on the Drawings as Road No. 8, will be constructed from a point on an existing road located on the line between Sec. 19, T 7 N, R 6 E, 1st P. M., and Sec. 24, T 9 N, R 5 E, 1st P. M., to a point on Road 9 located in Sec. 20, T 7 N, R 6 E, 1st P. M., and will cross Loramie Creek Valley along the top of the Lockington Dam. This work will include the construction of a single-span steel bridge over the spillway of the Lockington Dam; the necessary bridge abutments, culverts, guard-rails and right-of-way fences; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 3, 19, and 20.

A road about 2 miles in length, designated on the Drawings as Road No. 9, will be constructed from a point on an existing road located on the line between Sec. 29 and Sec. 30, T 7 N, R 6 E, 1st P. M., to a point on an existing road located on the line between Sec. 18 and Sec. 19, T 7 N, R 6 E, 1st P. M. This work will include the construction of a single-span steel bridge over Mill Creek, together with the necessary bridge abutments; the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 3, 21, 22, and 23.

The existing road located along the line between Sec. 18 and Sec. 19, T 7 N, R 6 E, 1st P. M., will be raised to elevation 907 for a distance of about half a mile east of Loramie Creek. This revision will include the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 10, are shown in Exhibit 3, Sheets 3 and 24.

The course of the existing road on the north side of Loramie Creek will be changed from a point near the center of Sec. 3, T 9 N, R 5 E, 1st P. M., to a point on the line between Sec. 2 and Sec. 11, T 9 N, R 5 E, 1st P. M. This change, designated on the Drawings as Road No. 11, will be about 2 miles in length. The work will include the construction of such culverts, concrete bridges, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are included in Exhibit 3, Sheets 3, 25, 26, and 27.

That portion of the existing road located in the NE ¼ of Sec. 30, T 7 N, R 6 E, 1st P. M., and in the SE ¼ of Sec. 19, T 7 N, R 6 E, 1st P. M., which lies within the area required for the construction of the dam and its appurtenances, will be abandoned, the abandonment to become effective upon the execution of the contract for the construction of the dam.

Telegraph Lines and Telephone Lines

The existing pole line crossing the Lockington dam site in Sec. 19 and Sec. 30, T 7 N, R 6 E, 1st P. M., and the existing pole line crossing Loramie Creek in Sec. 19, T 7 N, R 6 E, 1st P. M., can be replaced by constructing a new line which would pass around the east end of the Lockington Dam. These changes would necessitate the construction of about 3½ miles of line.

The owners of these pole lines shall be bound to remove them from within the area required for the construction of the dam and its appurtenances, within 3 months from the date of the execution of the contract for the construction of the Lockington Dam, as provided in Section 20 of the Conservancy Act.

TAYLORSVILLE RETARDING BASIN

General

A retarding basin will be formed by the construction of a dam across the valley of the Miami River in Montgomery County, at a location about half a mile above Taylorsville.

In case of a storm like that of March, 1913, this basin, together with the Lockington Retarding Basin, would reduce the flood flow from about 127,300 second feet to about 51,300 second feet. Such a storm would fill the Taylorsville Retarding Basin to elevation 815, at which stage 152,000 acre feet of water would be held in the basin, covering 9650 acres of land. Since 6700 acres of this area were actually flooded in March, 1913, the additional area flooded by the building of the dam would be 2950 acres. In 4½ days after reaching its maximum stage during this storm, the basin would be empty.

The Dam

The dam will occupy parts of the SW ¼ of Sec. 36, R 8, T 2, M.R's, and of the NW and NE quarters of Sec. 28, T 3 N, R 6 E, of the 1st Principal Meridian. The center line of the dam will be 2980 feet long, extending from a point in the NE ¼ of the NW ¼ of Sec. 23, T 3 N, R 6 E, 1st P. M.; easterly to a point in the SW ¼ of the SW ¼ of Sec. 36, R 8, T 2, M.R's; as indicated on the map, Exhibit 1, Sheet 11. A cross section of the dam is shown in Exhibit 2, Sheet 13. The top will be at elevation 837. At elevation 770, which is the average surface elevation of the valley, the dam will be 390 feet thick.

The Outlet Works and Spillway

The outlet works and spillway will be combined in one structure and will be built through the hill at the east end of the dam. This structure will provide an open channel, except along a continuation of the center line of the dam, where a concrete waste weir will be constructed, 132 feet long in the clear and with its crest at elevation 818. Through the base of the waste weir four conduits of equal size will be constructed to provide a free passage for the water. The upper inside surface of these conduits will be lined with very rich, dense, and hard concrete. The inverts, and the sides

for a short distance above the inverts, will be lined with the best quality vitrified brick, in order that this part of the lining may be renewed, should it become worn. Any one of the conduits may be closed temporarily during the low water season, for inspection or repairs. The conduits will be 40 feet long and the area of each will be 279 square feet. If the spillway ever should come into use, the channel that is provided for the conduits will be adequate to convey the water to the river below the dam.

An agreement has been entered into between the Conservancy District and the State of Ohio, whereby the outlet works will be allowed to occupy the present bed of the Miami and Erie Canal. If the canal ever should come into use, a gate can be placed in the spillway at the location of the canal, without interfering either with the use of the canal or the effectiveness of the retarding basin.

Railroads

The main line of the Cincinnati, Hamilton & Dayton Railroad from Cincinnati to Detroit, and the Peoria & Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis Railway will be affected more or less either by the construction or by the operation of the Taylorsville Dam.

THE CINCINNATI, HAMILTON & DAYTON RAILROAD

The Cincinnati, Hamilton & Dayton Railroad passes through the west end of the dam site at an elevation about 30 feet below the spillway crest. It is not feasible to raise the track to the spillway elevation on the present location. But by leaving the present track about 3 miles below the dam site, or 2½ miles above the bridge across the Miami River, north of Dayton, and bearing to the west along the high ground, the elevation can be made very satisfactorily without exceeding or even reaching the maximum ruling grade and maximum curve now being used on this division. This re-location would pass through the west end of the dam a little above spillway elevation, and then continue level along the high ground west of the present track until a point is reached on the present track about 1½ miles below Tippecanoe City, or 4½ miles above the dam site. As provided in Section 20 of the Conservancy Act, the Railroad Company shall vacate its tracks through the dam sites and within the area affected by the construction of the dam and appurtenances, within the time specified, which time in this case shall be eighteen months from the date of the execution of the contract for the construction of the Taylorsville Dam.

No cities or villages will be in any way affected by this change.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY

The track of the Peoria and Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis Railway is below the spillway elevation from a point about 3000 feet west of Grayson Station or 3½ miles east of Troy, east about 4 miles to the bridge across Indian Creek. The most practical way to raise this track is to rebuild on the high ground to the north. This re-location has been surveyed and is well within the limits of curvature and grade now in use on this division. The new location is about 200 feet longer than the present track. No cities or villages will be affected by this change.

Highways

Above and near the dam the following highway changes will be necessary:

A road about three-fourths of a mile in length, designated on the Drawings as Road No. 12, will be constructed from a point on an existing road located on the line between Sec. 22 and Sec. 23, T 3 N, R 6 E, 1st P. M., to a point on an existing road located in the E ½ of Sec. 23, T 3 N, R 6 E, 1st P. M. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 4 and 28.

A road about 1½ miles in length, designated on the Drawings as Road No. 13, will be constructed from a point on Road No. 12 located in Sec. 23, T 3 N, R 6 E, 1st P. M., to a point on an existing road located in Sec. 35, T 2, R 8, M.R's, and will cross the Miami River Valley along the top of the Taylorsville Dam. This work will include the construction of a suitable crossing at the point of intersection of the highway with the Cincinnati, Hamilton & Dayton Railroad; a single-span steel bridge over the spillway of the Taylorsville Dam; the necessary bridge abutments, culverts, guard-rails, and right-of-way fences; and the surfacing of the new sub-grade with unrolled gravel. If the Cincinnati, Hamilton & Dayton Railroad is reconstructed on the location now proposed, the highway will cross over the railroad by means of a single-span steel bridge. A location map and profile of this road are shown in Exhibit 3, Sheets 4, 29 and 30.

The existing east and west road located in Sec. 1, R 9, T 1, M.R's and Sec. 31, R 9, T 2, M.R's will be raised to elevation 790 for a distance of about a fourth of a mile east of the Miami River. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new

sub-grade with rolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 14, are shown in Exhibit 3, Sheets 4 and 31.

The existing east and west road located along the line between Sec. 2 and Sec. 3, R 9, T 1, M.R's and in Sec. 2, T 3 N, R 6 E, 1st P. M., will be raised to elevation 790 for a distance of about 300 feet east of, and about 800 feet west of the Miami River. This work will include the construction of such culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 15, are shown in Exhibit 3, Sheets 4 and 32.

That portion of the existing north and south road located in Sec. 23, T 3 N, R 6 E, 1st P. M., which lies within the area required for the construction of the dam and its appurtenances will be abandoned, the abandonment to become effective upon the execution of the contract for the construction of the dam.

Telegraph Lines and Telephone Lines

The existing pole line crossing the Miami River in Sec. 1, R 9, T 1, M.R's and in Sec. 11, T 3 N, R 6 E, 1st P. M., can be removed from all danger of flooding by reconstructing the line so as to cross the valley along the top of the Taylorsville Dam. This change would necessitate the construction of about 4½ miles of line, and is entirely feasible. The length of the new line would be about 2 miles greater than the length of existing line that it would replace.

The existing pole line crossing the Miami River along the highway located on the line between Sec. 2 and Sec. 3, R 9, T 1, M.R's, and in Sec. 2, T 3 N, R 6 E, 1st P. M., can readily be raised so that the wires of the line will not be below elevation 820. This change would necessitate the reconstruction of the existing line on its present location for a distance of about a fourth of a mile.

The existing pole line crossing Honey Creek in Sec. 36, R 9, T 2, M.R's, can be readily raised so that the wires of the line will not be lower than elevation 820. This change would necessitate the reconstruction of the existing line on its present location for a distance of about 1¼ miles.

The existing pole lines crossing the Miami River in Sec. 24, T 4 N, R 6 E, 1st P. M., and in Sec. 36, R 9, T 2, M.R's, can readily be raised so that the wires of the line will not be lower than elevation 820. These changes would necessitate the reconstruction of the existing lines on the present location for a distance of about 1¾ miles.

Tippecanoe City

Tippecanoe City is located west of the Miami River, about 6½ miles above the proposed dam of the Taylorsville Retarding Basin. A storm such as that of March, 1913, would raise the water within the basin to elevation 815, which would not reach First Street north of Main Street. A storm similar to that of 1898, the next largest since 1866, would fill the basin to elevation 792, and would not reach any part of the city.

During 1913, the flood stage at Tippecanoe City reached elevation 797, and caused but slight damage to the city. Water did not cover any of the streets, with the exception of a few hundred feet on Main Street east of the canal, near the corporation line.

A levee system of protection is proposed, with provision for diverting around the city the local storm water from the higher land. The proposed system of protection will not depreciate the outlying territory within the corporation limits, so far as its value for farming is concerned; and the most desirable locations for residential or industrial expansion are west of the canal. Under the proposed system, growth in this direction is not obstructed with the exception of a small area north of the levee east of Third Street which has been largely acquired for park purposes. The location of the proposed levee protection is shown on the map of Tippecanoe City, Fig. 41.

The levee as designed will be located as follows: Beginning at the D. & T. El. Ry. Co. power house near the southern corporation line, the levee will cross First Street and run northerly upon the Miami and Erie Canal site to Broadway; thence it will follow a northeasterly and northerly course and cross Main Street to the east of the municipal electric light and water station; thence will turn to the left and run in a northwesterly direction and cross the canal at Plum Street; and thence northerly along the west side of the canal to such a point that the levee may curve to the left, and run north of the Ford Wheel Works, cross Second Street, and end immediately west of Third Street, just north of its intersection with Union Street.

The crest of the proposed levee will be at elevation 821, or 3 feet above the Taylorsville spillway and 6 feet above the elevation which would be reached in the basin by a storm such as occurred in 1913. The cross section of the levee will be the same as the standard used for local protective works in the other cities. The levee will necessitate the removal of a few residences on Main Street, east of the canal.

Four highways cross the location of the proposed levee. At Second Street and Third Street the roadways will be graded to cross over the levee at its full height. If the roads crossing the levee east on Main Street and south on First Street were elevated to the full levee height, it would impose an increased burden upon all traffic. It is therefore proposed to elevate these more important

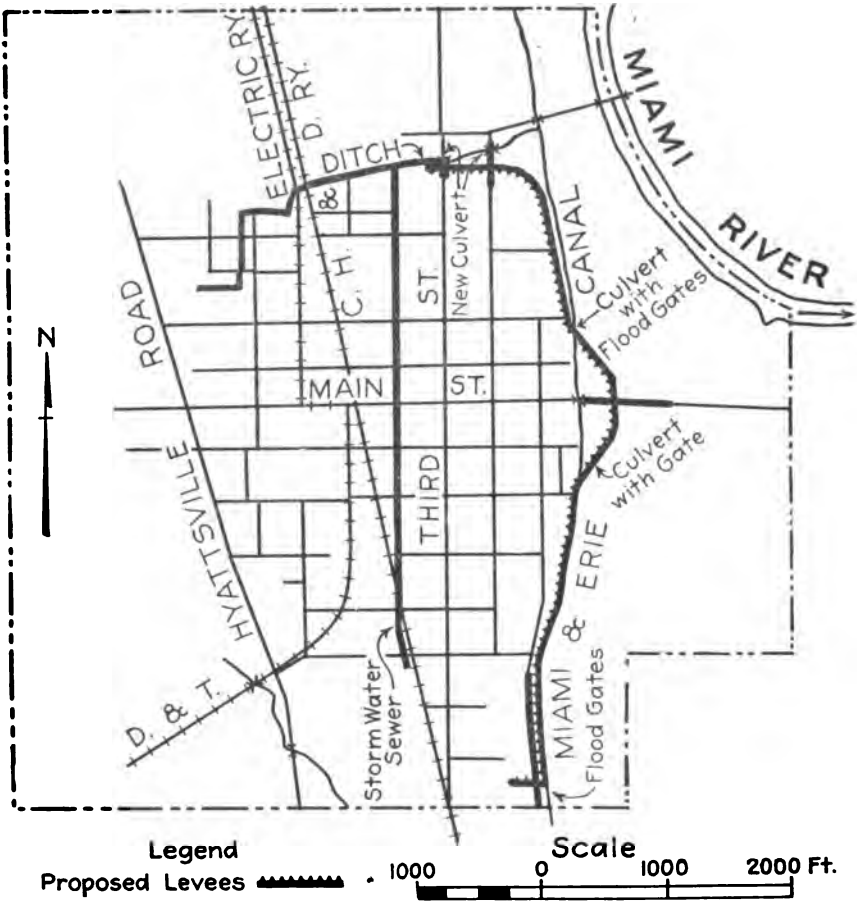


Fig. 41.—Map of Tippecanoe City, Ohio, showing proposed local flood protection.

roads only to a point within 3 feet of the top of the levee. These two crossings will then be level with the Taylorsville spillway, or 3 feet above the estimated high water in the Taylorsville Basin during a storm equal to that of 1913. If through any possibility, water should reach such an elevation as to require it, the raising of these crossings could be quickly accomplished.

By permission granted by the State authorities, the Miami and Erie Canal, from the southern end of the levee near the power house of the D. & T. El. Ry. Co., northerly to Broadway, will be filled and used for the site of a portion of the levee, this being the most economical location. A 24-inch conduit will be laid along the bed of the canal, and provided with a gate at its lower end near the power house. At the Plum Street crossing, the present flow in the canal will be passed through the levee by means of a 24-inch culvert provided with a gate. The agreement made with the State is subject to the right of the State to require relocation of the levee should traffic upon the canal be renewed.

At present the village sewers all discharge into the canal, as do one or two small brooks. The water is now used for condensing purposes.

Two storm water lines will be built to intercept the drainage from the area west of Fourth Street, including that west of the Hyattsville Road; and will be located on land entirely above the extreme high water stage of the Taylorsville Retarding Basin, in order that their operation may not be interrupted by water in the basin. These lines will carry the drainage northward to the ditch which runs eastward near the corporation limits.

The westerly of these two lines will be an open watercourse, intercepting the existing sewers and all surface water at a point about 150 feet south of the corner of Eighth and Crane Streets. It will run eastward, and then northward a short distance west of Seventh Street to the ditch above mentioned. This will eliminate damage caused under present conditions by flooding along Plum Street.

The other line will be a storm water intercepting sewer following the west side of the Cincinnati, Hamilton and Dayton Railroad, from a point just south of Elm Street to German Street, thence north on Fourth Street to the same ditch at the northern end of the town. The connections of the present sewers to the intercepting sewer on Fourth Street will be arranged so as to permit the flow of sewage along its usual course eastward to the canal, except during extreme high water.

The free discharge of storm water will not be obstructed until the water in the Taylorsville Basin has reached a stage above elevation 800. This would require a flood considerably greater than that which occurred in 1898. During times of such high water, the run-off from the area east of Fourth Street will have to be stored temporarily, and for this purpose the District will acquire the low

ground on the east side of Main Street, lying between the canal and the proposed levee.

The construction of the proposed 24-inch conduit on the site of the canal south of Broadway will remove from sight for a considerable distance the foul water of the canal. The city might, at slight expense, extend a small sized sanitary sewer from this to intercept the sewage from the Main Street and Plum Street sewers. If this were done, a great improvement in the sanitary condition of the city would result.

Besides the 24-inch conduit, and the culvert laid in the canal as before mentioned, other culverts with gates will be built through the levee where required.

The net results of the work at Tippecanoe City will be to leave the village in much better condition, so far as damage from storm or flood water is concerned, than it ever has been.

Plans for the work are shown in Exhibit 2, Sheet 15.

HUFFMAN RETARDING BASIN

General

A retarding basin will be formed by the construction of a dam across the valley of Mad River, in Greene County, at the location known as Huffman's Hill, about 6 miles easterly from the center of Dayton.

In case of a storm like that of March, 1913, this basin would reduce the flood flow from about 78,300 second feet to about 32,600 second feet. Such a storm would fill the basin to elevation 830, at which stage 124,000 acre feet of water would be held in the basin, covering 7,300 acres of land. Since 3,420 acres of this area were actually flooded in March, 1913, the additional area flooded by the building of the dam would be 3880 acres. In 5 days after reaching its maximum stage during this storm, the basin would be empty.

The Dam

The dam will occupy parts of the SW and NW quarters of Sec. 7, R 8, T 2, M.R's. The center line of the dam will be 3,340 feet long, extending from a point in the SE ¼ of the SW ¼ of Sec. 7, R 8, T 2, M.R's; northerly to a point in the SW ¼ of the NW ¼ of Sec. 7, R 8, T 2, M.R's; as indicated on the map, Exhibit 1, Sheet 11. A cross section of the dam is shown in Exhibit No. 2, Sheet 17. The top will be at elevation 850. At elevation 785, which is the average surface elevation of the valley, the dam will be 380 feet thick.

The Outlet Works and Spillway

The outlet works and spillway will be combined in one structure and will be built at the south end of the dam along the edge of the present river bed. This structure will provide an open channel, except on the center line of the dam where a concrete waste weir will be constructed, 100 feet long in the clear and with its crest at elevation 835. Through the base of the waste weir three conduits will provide a free passage for the water. The upper inside surface of these conduits will be lined with very rich, dense, and hard concrete. The inverts, and the sides for a short distance above the inverts, will be lined with best quality vitrified brick, in order that this part of the lining may be renewed, should it become worn. Any one of the conduits may be closed, temporarily during the low water season, for inspection or repairs. The conduits will be 40 feet long and the area of each will be 235 square feet. If the spillway ever should come into use, the channel that is provided for the conduits will be adequate to convey the water to the river below the dam.

Railroads

The Cleveland, Cincinnati, Chicago & St. Louis Railway, The Nypano Railroad (The Erie Railroad), and the Dayton and Springfield branch of the Ohio Electric Railway will be affected by the construction of the proposed Huffman Dam.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY and THE NYPANO RAILROAD (THE ERIE RAILROAD)

The Cleveland, Cincinnati, Chicago & St. Louis Railway and The Nypano Railroad (The Erie Railroad), between Dayton and Cold Springs, are at present being operated jointly as one double track road. Consequently they have been considered as such in all estimates for changes necessary to meet the requirements of the Conservancy plans.

These roads at the present time pass through the dam site. In order to raise them the required amount without exceeding the present maximum ruling grade on this division of the Cleveland, Cincinnati, Chicago & St. Louis Railway, it is necessary to begin relocation just east of Findlay Street, in the City of Dayton. A new location is feasible beginning at this place and bearing somewhat to the south of the present track of the Cleveland, Cincinnati, Chicago & St. Louis Railway passing through Huffman's Point south of the dam, then following in general the south edge of the Huffman Basin, passing slightly south of Fairfield, and joining the

present tracks about one mile west of Enon. Neither the maximum ruling grade nor the maximum curvature being used at present on this division has been exceeded.

As provided in Section 20 of the Conservancy Act, these railroad companies shall vacate their tracks through the dam site and within the area affected by the construction of the dam and appurtenances, within the time specified, which time in this case shall be two years from the date of the execution of the contract for the construction of the Huffman Dam.

This change will cause both railroads to be moved from the town of Osborn.

TEMPORARY CHANGE OF CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY

The present track of the Cleveland, Cincinnati, Chicago & St. Louis Railway passes through the proposed site of the combined spillway and outlet works, making it necessary to shift this track several feet further into the hill to the south, while the relocation described above is being constructed. A very satisfactory relocation has been worked out which will require about 3500 feet of track to be changed. Neither the maximum ruling grade nor the maximum curve now being used on this division has been exceeded.

The Railroad Company will be allowed to make this change as it sees fit, provided that within 90 days from the date of the execution of the contract for the construction of the Huffman Dam, the Railroad Company shall vacate the site of the proposed spillway and outlet works.

THE OHIO ELECTRIC RAILWAY

The Ohio Electric Railway, at the present time, passes through the south end of the Huffman Dam site, through the basin from the dam site to Fairfield, and from Fairfield through Osborn to Carlisle Junction. A new location has been worked out leaving the present track about 1200 feet west of the east line of Montgomery County, and passing just south of the south end of the dam, then following in general the location described for the steam roads to Fairfield. From Fairfield this location bears to the northeast, and follows in general the foot of the hills to the south margin of Mad River Valley, and then across the valley to Carlisle Junction. The maximum ruling grade and maximum degree of curve are within the limits for this division at the present time. As provided in Section 20 of the Conservancy Act the Railway Company shall vacate its track through the dam site and within the area affected by the construction of the dam and appurtenances, within the time specified, which

time in this case shall be two years from the date of the execution of the contract for the construction of the Huffman Dam. This change will cause the electric railway to be removed from the town of Osborn. No other cities or villages will be affected.

TEMPORARY CHANGE OF OHIO ELECTRIC RAILWAY

The present track of the Ohio Electric Railway passes through the site of the proposed combined spillway and outlet works, making it necessary that the track be moved from this place as soon as practicable after the execution of the contract for the construction of the Huffman Dam.

A relocation has been worked out using the proposed permanent change, as previously described, up to a point slightly east of the end of the dam, then in a general way down the hill along the Springfield Pike back to the present track near the foot of the hill. This change does not require that the present limits of ruling grade and maximum degree of curve for this division be exceeded.

The Railway Company will be allowed to make the change as it may see fit, provided it vacates its present track through the site of the spillway and outlet works within 90 days from the date of the execution of the contract for the construction of the Huffman Dam.

Highways

Above and near the dam the following highway changes will be necessary.

The course of the Valley Turnpike will be changed from a point in the E ½ of Sec. 13, R 8, T 2, M.R's, to a point in the S ½ of Sec. 3, R 8, T 2, M.R's. This revision, designated on the Drawings as Road No. 16, will be about 2¼ miles in length. The work will include the construction of such culverts, concrete bridges, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with rolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 5, 33, 34, and 35.

A road about 1 mile in length, designated on the Drawings as Road No. 17, will be constructed from a point on Road No. 16 located in the NW ¼ of Sec. 7, R 8, T 2, M.R's, to a point on an existing road located in SE ¼ of Sec. 7, R 8, T 2, M.R's, and will cross the valley along the top of the Huffman Dam. This work will include the construction of a single-span steel bridge over the spillway of the Huffman Dam; such bridge abutments, culverts, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this road are shown in Exhibit 3, Sheets 5, 36 and 37.

The existing road, located in Sections 7, 1, and 2, R 8, T 2, M.R's, and in Sec. 32, R 8, T 3, M.R's, will be raised to elevation 805 for a distance of about 2 miles, and the portion located near the east end of the Huffman Dam will be raised so as to cross the top of the dam at grade. These revisions will include the construction of such culverts, concrete bridges, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with rolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 18, are shown in Exhibit 3, Sheets 5, 38, 39, and 40.

The existing road crossing Mad River in Sec. 8, R 8, T 2, M.R's, will be raised to elevation 800 for a distance of about 1 mile east of Mad River, and the portion of this road located in the NE ¼ Sec. 1, R 8, T 2, M.R's, and in the NW ¼ of Sec. 31, R 8, T 3, M.R's, will be raised to elevation 805 for a distance of about three-fourths of a mile. These revisions will include the construction of such culverts, concrete bridges, guard-rails, and right-of-way fences as are required; and the surfacing of the new sub-grade with unrolled gravel. A location map and profile of this revised road, designated on the Drawings as Road No. 19, are shown in Exhibit 3, Sheets 5, 41, 42, and 43.

That portion of the Valley Turnpike located in Sec. 7, R 8, T 2, M.R's, which lies within the area required for the construction of the dam and its appurtenances will be abandoned, the abandonment to become effective upon the execution of the contract for the construction of the dam.

Telegraph and Telephone Lines and Other Public Utilities

The existing pole line located along the Valley Turnpike, in Sections 2, 3, 7, 8, and 13, R 8, T 2, M.R's, can readily be relocated so that the wires of the line will not be lower than elevation 830. This change would necessitate the relocation of about 2½ miles of line.

The owners of the pole line shall be bound to remove it from within the area required for the construction of the dam and its appurtenances, within 3 months from the date of the execution of the contract for the construction of the Huffman Dam, as provided in Section 20 of the Conservancy Act.

The existing pole line located along the Dayton-Springfield Turnpike in Sections 1, 2, and 7, R 8, T 2, M.R's, and in Sec. 32, R 8, T 3, M.R's can readily be raised so that the wires of the line will not be below elevation 825. This change would necessitate the reconstruction of the existing line on practically the same location for a distance of about 2 miles.

The existing pole line crossing Mad River in Sec. 3, R 8, T 2, M. R's, and then running in a northerly direction in Sections 3 and 4, R 8, T 2, M.R's, can readily be raised so that the wires of the line will not be below elevation 835. This change would necessitate the reconstruction of the existing line on the present location for a distance of about 1¾ miles.

The existing transmission lines of the Dayton Power & Light Company located in Sections 1, 2, 3, and 7, R 8, T 2, M.R's, and in Sections 27, 28, 29, 33, 34, and 35, R 8, T 3, M.R's, can be removed from all probability of flooding by relocating the lines so as to follow along the edge of the Retarding Basin. This change would necessitate the construction of about 10 miles of line. The length of the relocated lines would not be materially different from the length of the existing lines that they would replace.

Estimates of cost have been made, based on options and contracts obtained by the Directors, of all damages to electric transmission and gas-pipe lines, and other public utility properties, excepting railroads, located in and around the City of Osborn, and affected by the construction of the Huffman Retarding Basin. The estimated cost of these damages is included as a part of the total estimated damages.

Fairfield

Protection against back water in the Huffman Basin is planned for the Village of Fairfield. In case of a flood as great as that of 1913, the water would rise only on the lower parts of the town, but in accordance with the provision for high water in the retarding basins due to a storm much greater than that of 1913, protection is included for nearly the whole town. The location of the proposed protection work is shown on the map of Fairfield, Fig. 42.

This will consist of a levee, beginning at the east side of the village at the Xenia Pike, where the ground surface has an elevation of 838 feet, and extending northwesterly to the Springfield Pike, thence southwesterly across Xenia Street to the Dayton Pike, and thence in a southeasterly direction to high ground. The entire village will be protected except about 30 lots, mostly vacant, at the outskirts of the village. The levees will be provided with the same margin of safety as is provided for levees in the city of Dayton, and will be of the same standard cross section as is used in the local protective works at the various cities.

Storm water falling within the area inclosed by the levee will be discharged through it by means of culverts, fitted with gates, placed at controlling points. In case of the occurrence of a great flood, for

protection against which the improvement is planned, these gates would be closed and local surface drainage would be permitted to collect and be stored temporarily on the low farm land in the southeast portion of the inclosed area, just outside of the town proper.

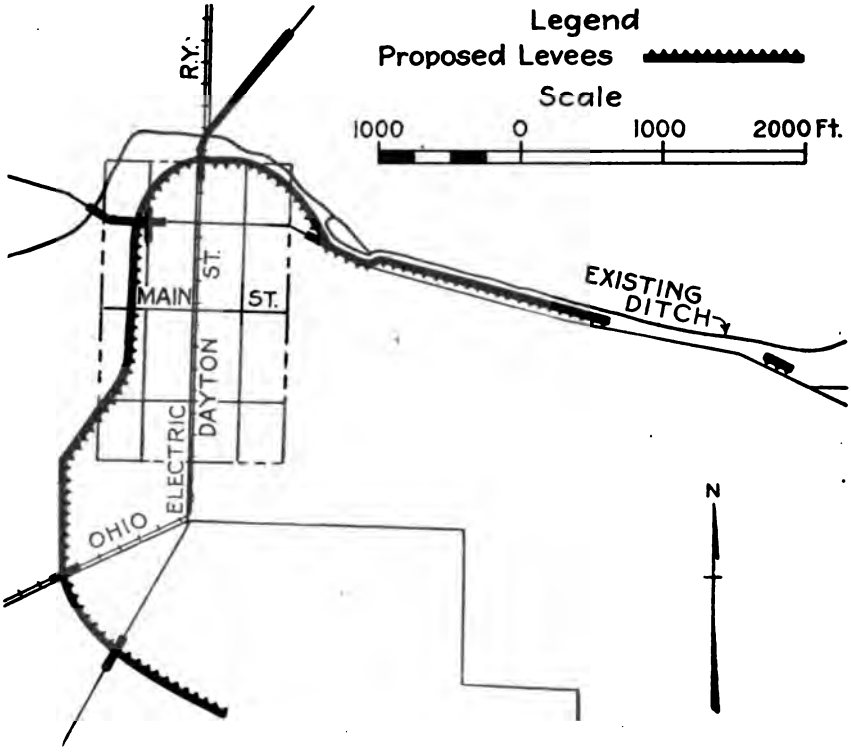


Fig. 42.—Map of Fairfield, Ohio, showing proposed local flood protection.

Inasmuch as the water surface in the Huffman Retarding Basin would rise slowly at the higher stages ample time would be available for looking after and closing the culvert gates.

Plans for the improvement are shown in Exhibit 2, Sheets 19 and 20.

LOCAL PROTECTION AT CITIES AND TOWNS

GENERAL DESCRIPTION

Up to a certain limit channel improvement is economical, especially when it can be secured by means of levees, or by providing uniform cross-section and stable banks. In this Plan the reduction of flood flow by means of retarding basins is carried to such a point, that further necessary protection can reasonably be secured by local improvements of the river channels within the various cities, with minor changes in bridge approaches, sewer and water pipe locations, flood gates on canals and hydraulics, and by adding such other details as may be necessary to make the work completely effective.

Local improvements will consist in the main of excavating the river channel to a nearly uniform cross section and grade, improving the alignment, providing overflow areas and overflow channels, building retaining walls and bank revetment to prevent erosion or caving of the banks, and building levees to increase channel capacity by increasing the permissible depth of flow.

The levee section which has been adopted as a standard has a top width of 8 feet, and side slopes of 2 horizontal to 1 vertical for the first 10 feet below the top, of 2½ horizontal to 1 vertical for the second 10 feet and, in the few cases where a height of 20 feet is exceeded, of 3 horizontal to 1 vertical for the remainder. Except in exposed places the standard levee slopes will be planted to grass. The soils of the valley are exceptionally well suited for levee construction, and these sections are heavier than those used in the valley with success for the past 50 years or more. Where it is found necessary to strengthen or raise existing levees at places where space is limited, a lighter section may be used, provided the original levee proves that the material will be stable upon the steeper slopes. Practically the only cause of failure of levees in the valley has been by overtopping.

The standard freeboard adopted for levees is 3 feet. By freeboard is meant excess height of levee over the elevation that would be reached by the water, with retarding basin control, in a flood equal to the maximum assumed flood.

At the north end of Hamilton, on the east side of the river, and at the north end of Troy, this freeboard is increased because of the

importance of these levees, and the very low additional cost of the extra degree of protection so provided. In a few other places where high levees would be very expensive in proportion to the value of the property protected, this freeboard is reduced.

The standard slope of bank for unprotected excavated channels is 2 horizontal to 1 vertical. In a few cases, on the inside of bends, where a flat slope would result in expensive condemnation and where velocities will be low, steeper slopes will be used. Where retaining walls are planned they will be of concrete of standard section as shown on Sheet 1 of Exhibit 6, except where these standard sections are modified to adapt them to the configuration and character of the ground or to other local conditions.

Standard slope revetment, where used, will be of monolithic reinforced concrete construction 6 inches thick. Standard flexible concrete lining of the bed, where used, will consist of reinforced concrete blocks fastened together. The concrete in the retaining walls and bank revetment will be given a dark color at some of the more prominent points to improve its appearance over that of glaring white concrete, and where desirable will be marked off in squares.

To some extent, removal of trees will be required at nearly all cities and towns where river improvement is required. This refers largely to trees which grow on the river bottom and seriously retard the flow. Many of the trees which have been allowed to grow on the river side of levees must also be removed. Their presence endangers the levee in several ways. Scour around the trees is induced, the ground and revetment may be lifted by root growth and wind action loosens the earth by pulling at the roots.

Drawings showing the plans for the various local improvements are included in the Exhibits of the Contract. The estimated quantities of the various kinds of work, and the estimated costs, are given in the Estimates, and the manner of doing the work as a whole and as individual items is outlined in further detail in the Specifications.

The following is a description of the local flood protection works planned for the various cities and villages of the valley as part of the proposed plan of improvement of the Miami Conservancy District.

PIQUA

The principal part of the city of Piqua lies on the west side of the Miami River, although two communities, Shawnee, lying south of the Pennsylvania Railroad, and Rossville, northeast of the city, are on the east side. The river makes a semi-circular bend to the

east, and the low ground within this bend on the west side of the river is to a considerable extent occupied by residences.

During the 1913 flood, the city was damaged by the overflow of the south bank of the river west of Main Street; by the overflow and partial destruction of property within the loop above mentioned, where the swift current entirely destroyed a number of buildings, and where the water was 15 feet deep; by the flooding of Shawnee, where other houses were destroyed by the deep water and the swift current; and by the flooding to a limited extent of the business section of the city along Main Street.

The drainage area above Piqua is about 840 square miles, of which about 255 square miles lies above the Lockington dam site on Loramie Creek. The maximum flood flow through Piqua during the 1913 flood was about 70,000 second feet. The Plan provides for the protection of the City against a flood of more than 90,000 second feet, with a 3-foot margin of safety on the earth levees. The Lockington Retarding Basin will reduce the flow in Loramie Creek by about 25,000 second feet, and in addition a local protection is planned which will give the river through Piqua capacity for carrying 70,000 second feet.

Improvements in the city of Piqua are now being made by the Commissioners of Miami County. The levee has been raised around the bend in the river east of the city, and a levee is being constructed on the east side of the river from the Pennsylvania Railroad south to Bridge Street. The material for the levee was taken from the river side, thus slightly increasing the channel capacity. This levee has a greater top width, but steeper slopes, than the standard adopted for the Plan.

The improvement under construction at Piqua is entirely insufficient for the protection of those parts of the city east of the river, and within the loop, while no effort has been made to protect the city from overflow from the north and west of Main Street. Neither has any work been done to protect the south part of the city west of the river, except the excavation of earth needed for building the levee and the removal of brush and trees from the channel. In addition to the work done by the county and in addition to the construction of the Lockington Basin, the works described below are necessary to make the city secure from floods. The levees built and being built by the county will protect the city from moderate floods, but in case of a great flood, like that of 1913, these levees would surely fail, with a repetition of such conditions as prevailed during that flood.

The local improvements included in the Plan consist essentially in raising and strengthening the levees, in improving the section and alignment of the channel, especially at the bend above the Pennsylvania Railroad bridge, and in protecting the city from overflow through the Miami and Erie Canal by means of flood gates. Maps and plans for this work are included in Exhibit 7, and the location is shown on the map of Piqua, Fig. 43.

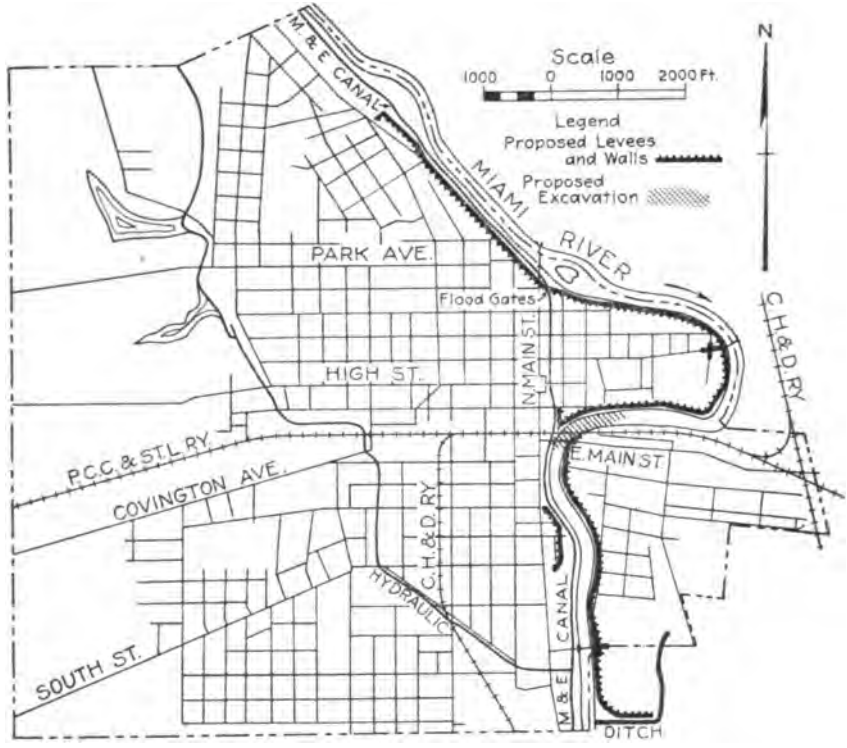


Fig. 43.—Map of Piqua, Ohio, showing proposed local flood protection.

Levee and Flood Wall Construction

On the west side of the river a levee will be constructed, beginning on the higher land just east of River Street on the property of The Western Ohio Railroad Company, and extending southeasterly approximately parallel to the right bank of the Miami & Erie Canal to a point about opposite Gill Street. As the limited space between the traction line and the canal makes impracticable the construction of an earth levee between them, a concrete wall will be constructed from this point to a point about 150 feet east of Main Street, where

the Miami & Erie Canal will be crossed by means of flood gates. The standard levee will then be continued, a low concrete wall being used to supplement the earth embankment from the canal to Spring Street.

Around the loop the new earth levee will, with minor exceptions, follow the line of the existing levee and will be more than twice as large as the existing levee. The top will be three feet above extreme high water. The present levee around the loop would fail in case of a flood less than half as great as that of 1913. At Ash Street the river is unusually narrow and the construction of a levee east of the slaughter house immediately above the bridge would further restrict the channel. On account of the high velocities which would result from this restriction, the safety of the bridge and of the levee itself would be endangered. The levee therefore will cross Ash Street at a point about 150 feet from the river's edge, the line leaving the location of the present levee at the end of Green Street and connecting with it again about 200 feet south of Ash Street. The slaughter house doubtless will be removed in a few years, and in time a new bridge must be built. By building the new bridge straight across the river to the new levee, and by removing the present levee and wall which now protect the slaughter house, the river channel at this point will be further greatly improved.

Another narrow point in the channel exists at the slaughter house about 700 feet south of Ash Street. To avoid encroaching on the present waterway a concrete wall will be built at the location of the center line of the present levee to provide the additional height required. The construction of the levee embankment on the south side of the loop will require the reconstruction of the roadway of Water Street from Manning Street to a point west of Harrison Street. The increase in height of the levee around the loop east of Spring Street will be from about 4 to 6 feet. Ash Street at the levee crossing will be raised to the elevation of extreme high water, or 3 feet below the levee top.

At the bend in the river immediately above the Pennsylvania Railroad an improved alignment of the levee and of the channel will give a much better approach to the bridge and will result in a flood level around the loop approximately 2 feet lower than it would be if the channel at this point were not improved. This improvement requires heavy excavation in the channel and the protection of the new river and levee slope with concrete. Below the railroad on the west bank no protection will be required, except between

Young and South Streets, where a levee having a maximum height of about 10 feet, will be built. For the greater part of its length this levee will be located about 100 feet east of East Street. For a distance of about 1000 feet below South Street the buildings bordering Main Street need no further protection, while the expense of levee construction further south on the west bank would be out of proportion to the resulting benefit.

No levee construction is proposed on the east bank of the river above the Pennsylvania Railroad bridge. It is proposed to acquire the property within Rossville near the fork in the roads, and to remove the buildings, so that no obstruction will be given to the flood discharge over this area. The land to be thus acquired was wholly submerged at the time of the 1913 flood.

The construction on the east bank south of the railroad consists in the raising of the County levee to provide a 3-foot freeboard above maximum high water and to extend it to enclose the quarry south of Bridge Street, the line turning at a point south of this quarry and running in an easterly direction to the high land.

In order not to require a change in the Main Street bridge, a gap approximately 4 feet deep will be left in the levee at this point. In case of extreme high water this opening must be closed temporarily to prevent the inflow of flood water. At the crossing of the levee at Bridge Street it is proposed to raise the street to the elevation of the maximum high water.

Bridges and Highways

There are at Piqua four highway bridges and one railroad bridge. Of these structures the Bridge Street, Ash Street, and Main Street bridges all extend below the elevation of extreme floods. When these bridges are renewed the new structures should be placed at a higher elevation. The use of the new Union Street bridge will not be interfered with during maximum high water.

The location of the Pennsylvania Railroad bridge and embankment on the east side of the river is unfortunate, as the construction of an improved channel on the most desirable lines is prevented. The bridge as reconstructed, however, has an ample length between abutments for the improved channel. The piers are placed so as to interfere as little as possible with the flow of the water.

Drainage System

The construction of the levee to enclose the land south of Bridge Street on the east side of the river makes necessary the diversion of a small water course which now flows toward the river just north

of Bridge Street. It is proposed to construct an open ditch just outside of the new levee to care for this flow. As the main levee construction consists in the enlargement of levees already built and does not add to the necessity for drainage outlets, it is not proposed to build any new culverts through existing levees. At a very few places where a levee is proposed and where no levee has existed in the past, small culverts provided with gates will be built.

TROY

The drainage area of the Miami River above Troy is 908 square miles, of which 255 will be controlled by the Lockington Retarding Basin, and 100 are partially controlled by the Lewistown State reservoir. With the protection afforded by the Lockington Basin, it is estimated that the future maximum flow from a storm similar to that of 1913 would be 78,000 second feet.

The maximum water level in the Miami at Troy in all floods and under all conditions will be determined by the flow in the river through the city. It will not be affected by the water in the Taylorsville basin.

The plan for the local protection of Troy provides for the enlargement and improvement of the channel proper, an overflow and cut-off channel across the river bend below the city, the raising of existing and the construction of new levees north and northeast of the city, the lengthening of the Market Street Bridge, and the accompanying detail alterations. Some clearing of land by the removal of trees also will be made.

Maps and plans for the work are included in Exhibit 8, and the location is shown on the map of Troy, Fig. 44.

Overflow Channel

A cut-off channel will be built across the long river bend east of Troy. It will have a bottom width of 40 feet, a top width of about 70 feet, and will be excavated to the full depth of the adjacent river bottom. The channel will be eroded by the high flood velocities and probably in a comparatively short time will become the main waterway. The levee along the western side will be of full height, sufficient to protect the city during the maximum flow in the river. The new channel and the overflow space to the east, with the assistance of the existing channel until the overflow channel becomes enlarged, will be of sufficient capacity to carry the extreme river flow. The present levees for about 400 feet east of this cut-off channel will be removed.

Levees

To the north of the city from the high ground eastward to the Miami and Erie Canal, the recently constructed levee on the south side of the Morgan Ditch, near the northern corporation line will be enlarged and raised sufficiently to be 5 feet above the highest water in time of a flood materially greater than that of 1913. As this levee is the key to local protection at Troy, it should be built with a wide margin of safety. From the eastern end of this levee southward to Washington Street, the east bank of the Canal will be raised to

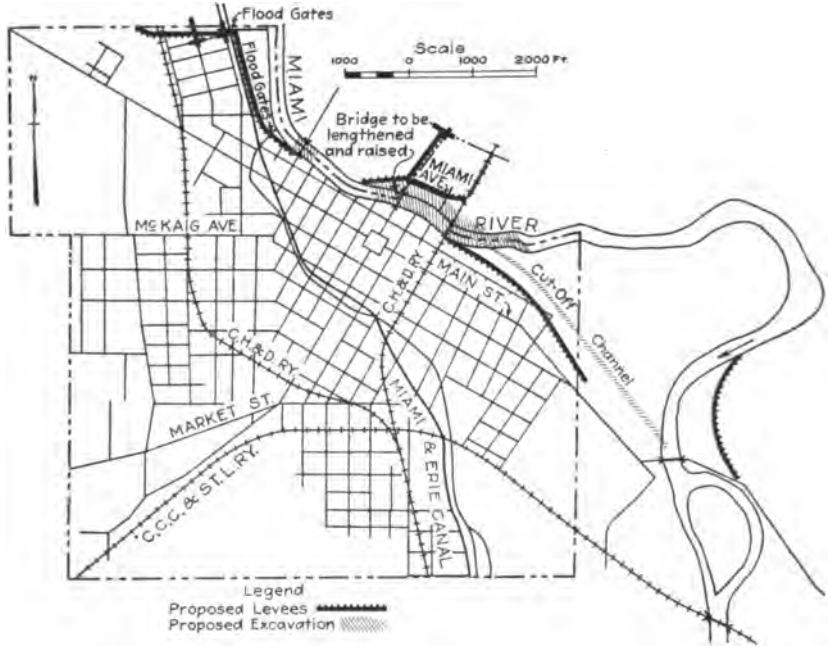


Fig. 44.—Map of Troy, Ohio, showing proposed local flood protection.

form a levee, and from Washington Street the levee will be built in a straight line to the river's edge at Adams Street. No levee will be needed on the west bank between Adams Street and the Cincinnati, Hamilton & Dayton Railroad. The maximum high water of the greatest possible flood will not reach Water Street, although some of the land along the margin of the river might be covered in such case. Starting again at the Cincinnati, Hamilton & Dayton Railroad, a levee will be built on the west bank, the present levee being raised along the river to a point opposite New Street, thence it will curve to the right and extend to a point about 200 feet east of Main

Street just below its junction with Franklin Street, forming the right bank of the overflow channel. No levee will be required below this point for the protection of the city.

On the east side of the river, the existing levee from Market Street north for a few hundred feet will be removed and rebuilt to its present height on a line to the east of its present location, as indicated on the map. The greatest distance that the levee will be set back is about 250 feet. To maintain the overflow area which has existed in the past when the river was high, this levee should not be raised above its present elevation.

A levee to full height will be built along the north or west side of Market Street from Staunton Pike to the above levee opposite Miami Avenue. South from Market Street it will follow the east side of Miami Avenue to Berry Street, thence to the north abutment of the Cincinnati, Hamilton & Dayton Railroad bridge.

Except as noted, the freeboard of the levees built at Troy will be 3 feet.

Channel Excavation

The excavation of about 160,000 cubic yards of material from the channel, for increasing its size and to give it a more regular cross section, will extend from the Adams Street bridge downstream to the upper end of the cut-off channel. In order to avoid the possibility of damage to the Adams Street bridge, a short length of the river between the Adams Street and Market Street bridges will not be deepened.

Bridges

The Adams Street concrete arch bridge is low and very deficient in waterway. The obstruction existing around the piers will be removed and, to prevent unsafe erosion, steel sheet piling will be driven across the river channel, leaving the top of the piling at the level of the bottom of the river. The Adams Street bridge is too small to allow a great flood to pass through it. The water at such times must overflow across the road east of the bridge, and to raise this road so as to prevent overflow before the Adams Street bridge is replaced by a larger one would seriously endanger the City. The fill just east of this bridge, built since the 1913 flood, should not be raised or lengthened.

The steel truss bridge at Market Street has not sufficient waterway for the proper discharge of the river flow during flood periods. The bridge shall be so raised or reconstructed that its bottom clearance line shall not be below elevation 834, and a 150-foot

span shall be added by the authorities in charge of the bridge, in accordance with Section 20 of the Conservancy Act of Ohio, the change to be completed within one year from the date of execution of the contracts for the improvement of the river channel at and near the bridge.

The Cincinnati, Hamilton & Dayton Railroad bridge now has ample waterway.

The waterway of the Broadford Road concrete arch bridge is insufficient, and will be supplemented by the overflow space provided on the east.

The Big Four railroad bridge has a somewhat small opening, but its distance downstream practically eliminates any effect through Troy. Also, the low elevation of the surrounding lands, roads and railroad embankment is such that overflow would take place before serious damage would be caused at the lower limits of Troy.

Streets and Highways

Elm and Harrison Streets, which cross the levee at the north end of the city, will be raised by inclined approaches to the height reached by the river during times of maximum high water; that is, to within 5 feet of the levee top. It seems better to plan on filling the gap at the road if necessary during great floods, than to have the extra 5 feet of grade to pass over at all times. Such filling would be a matter of an hour's work for a few men, and would not be needed except in case of a flood greater than that of 1913. The steel bridge over Morgan Ditch at Harrison Street will be raised, and the depth of fill on the Elm Street concrete bridge will be increased. Staunton Pike will be raised to within 3 feet of the levee top at its crossing on Market Street. The raised bridge and approaches will permit the free use of Market Street during flood times, as the overflow of the street will be prevented.

Railroads

The proposed plans do not contemplate changes in the railroads at Troy. The Cincinnati, Hamilton & Dayton Railroad track through the levee at Morgan Ditch is at the elevation of maximum high water, 5 feet below the levee top.

Canals and Races

At present but little use is made of the Miami and Erie Canal except for the disposal of storm water. It is proposed to carry the levee across this canal near the northern Corporation line by providing a gate of sufficient size to pass the small amount of water

flowing in the canal. No change will be required through the city or at the southern end of the city.

It is proposed to carry the levee, inserting in it a gate, across the local mill race near its upper end. At the lower end of the city it may be necessary to elevate the banks of the mill race for a short distance above the crossing of the Big Four Railroad to prevent overflow from backwater.

Sewers and Drainage

The outlet of the sanitary sewer system of Troy is located at the Miami River below the Big Four bridge. No change will be required in this system. At present, free discharge of the sewage is not possible during high water in the river. This condition will not be aggravated by the works of the District.

By far the larger part of the storm water from the main part of the city drains into the Canal which will discharge as heretofore. Where necessary gates will be installed on those storm water outlets which discharge directly into the river, and culverts or drains provided with gates will be built in the new levees where required.

The improvement above outlined, in connection with the Lockington Retarding Basin, will give protection to Troy from floods in the Miami River materially greater than that of 1913.

DAYTON

Channel Improvement Along Miami River

During the 1913 flood the maximum flow in the Great Miami River through Dayton was about 250,000 second feet. The gage reading of water surface at Main Street was about 29.0 feet, and the levees were submerged from 5 to 7 feet, or more.

The maximum flow at the Main Street bridge, below Mad River and above Wolf Creek, during the 1898 flood was about 90,000 second feet, the stage as indicated by the Main Street gage being 19.7 feet.

The improved channel will have sufficient capacity for carrying the discharge from the reservoirs during the assumed maximum flow in addition to the unregulated flow entering the river below the dams. The assumed maximum discharges are 75,000 second feet above Mad River, 110,000 second feet between Mad River and Wolf Creek, and 120,000 second feet below the mouth of Wolf Creek. The regulated flow will be about 20 per cent greater than the maximum discharge of the 1898 flood.

The work in general will consist of excavating the channel bed, and of strengthening and raising the levees. No radical change in

the alignment of the channel above Washington Street has been found necessary. The sharp bends that now exist are to be cut down to curves as flat as can be obtained without excessive excavation and land damage.

The width and cross section of the channel will be made as nearly uniform as possible and to conform approximately to the best portions of the existing channel. A modified trapezoidal section has been adopted to carry the flood flow and to give the bed a shape suitable to low water conditions. A narrow flat bottom, 150 feet wide, will be excavated to carry the low water flow. This narrow section will be 8 feet lower than the bottom at the foot of the side slopes, and will be located where the water naturally tends to make the deepest channel. From the margins of this thread of the stream, the bottom will slope gradually up to the foot of the side slopes or retaining walls. Where necessary, vertical retaining walls of concrete will be built to the full height of the levee. Where the available space is less limited, a low wall will be used at the bottom with a sloping bank above.

The grade of the main channel bed will be uniform, coinciding substantially with the existing river bottom at the ends of the excavated section, the Steele dam at the north, and Washington Street (the upper end of the channel being improved by the City) at the south. Figure 45 is a map of Dayton showing the location of the proposed channel improvements.

Above the Steele dam the levees will be raised to provide a freeboard of 3 feet at a time when 75,000 second feet of water is passing over the dam. About 4 feet will be the greatest addition needed. The levee adjoining the west end of the Steele dam will be brought to a better alignment, and the necessary adjustments made in the wall at this point.

Between the Steele dam and the Main Street bridge the channel is very irregular in shape and size and makes a very short turn opposite the mouth of Mad River. Through this stretch of the river the channel is to be made deeper and of nearly uniform section. The sharp turn on the north bank above the Main Street bridge is to be cut off, while at other places where the excessive width now causes eddies and disturbance of flow, the channel will be contracted to a more uniform and efficient section, and at the mouth of Mad River will be so constructed as to provide a more satisfactory junction and less disturbance to flow.

On the right (west) bank, from the Herman Avenue bridge southerly to the present levee location on Stillwater Avenue, a levee

with 2 to 1 slopes, paved below the ordinary water line, will be built. It will be aligned on a curve of about 1,100 feet radius. From this point, continuing the curve, the slope will be gradually transformed into a vertical retaining wall which will continue in a straight line to the north abutment of the Main Street bridge. The area between the present levee and the new one will be available for the disposal of excavated material. At the Miami Apartments, where the most severe cutting of the present bank will be made, a space of at least 25 feet will remain between the building and the top of the bank.

From the east abutment of the Herman Avenue bridge to the intersection with the north bank of Mad River the two banks of the river will be nearly parallel. The left bank will have a 2 to 1 slope and will be paved below ordinary water level and have a grassed surface above. Below the mouth of Mad River, the left bank will be a continuation of the left bank of Mad River, and will have a similar slope with a paved and grassed surface. Along Van Cleve Park to the Main Street bridge the existing stone wall will be used with a slight improvement in alignment.

The left (south) bank of the river from the Main Street bridge to a point about 500 feet westerly from Liberty Street will be given uniform alignment, and will be protected by a vertical concrete retaining wall, except for a stretch of about 400 feet at the end of Wilkinson Street, where the present levee will be used. Downstream from this wall the alignment will be made more nearly uniform, using a standard unpaved slope extending to the Dayton View bridge.

The right (west) bank will be but slightly changed, the alignment being somewhat modified by excavating near Forest Avenue and by filling in the receding angle located at the point where the levee leaves Lehman Street and the pocket in front of the sewer head-wall on Forest Avenue. The standard 2 to 1 unpaved slope will be used from Main Street to Forest Avenue. From Forest Avenue to the Dayton View bridge a 1½ to 1 paved slope will be necessary. Through this length the channel will be enlarged by excavation, and will be given a more uniform section.

Along the channel from the Dayton View bridge to the Third Street bridge the bottom will be excavated to the proposed channel lines. In this stretch the modification of the left (east) bank will be slight. The existing stone wall below the Dayton View bridge will be retained to a point about 200 feet from its lower end. From this point it will be removed and replaced by a wall upon a line of smooth curvature, the alignment passing through a point about 35 feet back of the present end of the wall at First Street, and from this

point the top will gradually slope downward, terminating within a distance of about 200 feet. From this point to a point 450 feet north of the Third Street bridge the levee will have the standard 2 to 1 slope, and from there to the Third Street bridge the existing levee will be used, these levees being supplemented by low wall construction.

On the right (west) bank between the Dayton View bridge and Salem Avenue, extensive cutting is required which will result in property damage. A retaining wall will be built for a short distance adjacent to the Dayton View bridge to minimize the encroachment on private property. Filling will be required to provide the necessary regularity and proper curvature on the west side of the channel from Salem Avenue to Wolf Creek, where a large eddy now forms during high water, and also between Wolf Creek and Third Street bridge.

The channel between Third and Fifth Streets is to be deepened, and widened by removing the encroachment between Syacmore and Maple Streets. At the narrowest part, the width will be increased from 550 feet to about 625 feet. The left (east) bank will consist of: first, a wall just below the Third Street bridge abutment, then a 1½ to 1 paved slope, and then, to avoid encroachment on Robert Boulevard, a vertical wall, starting opposite a point near Maple Street and extending to the Fifth Street bridge abutment. The west side of Robert Boulevard between Fourth and Fifth Streets will be filled and regraded. The existing levee on the right (or west) bank will be used by making slight changes at each end to properly approach the bridge abutments and by replacing such parts of the existing revetment as are not satisfactory.

Between the Fifth Street bridge and the Dayton and Union R. R. bridge the channel will be deepened and the existing levee banks will be used after adding suitable walls for approaching the new bridge abutments.

From the Dayton and Union R. R. bridge to the Washington Street bridge the channel will be deepened and aligned on a curve between the corresponding bridge abutments. Standard slopes will be used on the water side, and, so far as can be done advantageously, the surplus material from the channel excavation will be used to build the levees and to raise the ground behind the levees.

In order to provide a more direct and uniform river channel between Washington Street and the Big Four railroad bridge, a new leveed channel has been under construction by the City of Dayton. The work, which was undertaken before the 1913 flood,

has been seriously delayed, and no progress is now being made. Any part of this work not completed by the City must be assumed by the District in order to make effective the remainder of the local protection. In such case the changes in sewer outlets and other minor details will be left for the City to complete. The City's improvement will extend to the Big Four Railroad bridge. The cost of completing the channel and levee construction in this section is included in the estimates. The same type of improvement will be continued to Broadway, where the local protection works for Dayton will terminate.

Channel Improvement Along Mad River

During the 1913 flood the flow in Mad River reached about 75,000 second feet. With retarding basin control the flow from the maximum storm assumed would be reduced to 35,000 second feet at the dam, to which should be added about 2,000 second feet entering the river below the dam, making a total of 37,000 second feet to be provided for during a period of extreme flow.

No change will be made on Mad River above the Erie Railroad bridge about 2½ miles east of the center of Dayton, except for the removal of the railroad fill east of the river, which will be abandoned after the relocation of the Erie track. A safe flood gate will be provided on the Hydraulic near Springfield Pike and from this point to the Erie railroad track the existing bank will be established as a permanent levee. The left (south) bank near this eastern limit was not overtopped during the 1913 flood with a flow double that of the future maximum flow. On the right (north) side of the river above the Miami and Erie Canal no levee is proposed, as the City is not endangered by a possibility of overflow at this point. In case the owners of the property may in the future desire to construct a levee for the protection of the land immediately adjacent to the river, such a levee should be built and located according to the plans approved by the Directors of the District. A levee will be built against the north side of the Erie Railroad fill from a point near the bridge over Mad River westward to its intersection with the present levee leading to the Miami and Erie Canal feeder head gate. From there to the Miami and Erie Canal the present levee will be strengthened and raised. No change need be made in the diverting dam above Findlay Street.

From the Miami and Erie Canal crossing to a point near Thomas Street (about 1100 feet above Keowee Street) the south levee will be removed and rebuilt on a line averaging about 200 feet south of its present position. This will utilize the low land south of the ex-

isting levee as a floodway. From the end of this relocated levee to Keowee Street no change will be made in the left bank except the change required at the new Keowee Street bridge abutment. Along the right (north) bank, the present levee will be retained down to a point about 1000 feet above Keowee Street. From this point it will be necessary to cut into the bank to provide sufficient channel width and a suitable alignment to approach the new bridge. The lower end of the north bank is protected by a masonry wall which may be used for protecting the new bank.

From Keowee Street to Webster Street the channel alignment and width is satisfactory, except that a slight change will be made in alignment of the north wall below Keowee Street to join the bridge abutment. The levees will be slightly raised.

Just below Webster Street, the river will be confined by levees to a curved channel suitably entering the Miami River channel. The area back of these levees will be used for the disposal of excavated material.

No bottom excavation will be required along Mad River except at places where levee material must be obtained.

Channel Improvement Along Wolf Creek

The improved channel is to have a bottom width of about 120 feet using the present side slopes extended downwards, a minimum mean depth of about 15 feet, and will extend from the Pennsylvania R. R. bridge to the Miami River. The capacity will be about 35,000 second feet. There are five bridges over Wolf Creek within the limits of the City. The piers of the three two-span bridges will be reinforced with concrete and sheet piling about their foundations.

Bridges

Plans for the Dayton and Union R. R. bridge already under construction have been approved by the Directors of the District. The elevation of the new bridge will give ample clearance above the extreme high water. Plans have also been approved by the Directors for the reconstruction by the City of the Fifth Street bridge. Protection is provided for the piers at the Washington Street, Third Street, Dayton View and Main Street bridges.

Below Focke's Station there will be four bridges across Mad River, a steel truss bridge at Findlay Street, a concrete arch bridge at Keowee Street, the Cincinnati, Hamilton & Dayton Railroad through plate girder bridge below Keowee Street and a concrete arch bridge at Webster Street. The present Erie Railroad bridge

will be removed in connection with the relocation of the railroad and apparently the Miami and Erie Canal aqueduct will not be rebuilt. Plans for the new Keowee Street and Webster Street concrete arch bridges have been approved by the Directors of the District.

In connection with the reconstruction of the Keowee Street bridge, the location of Keowee and Valley Streets as they approach the bridge from the north will be changed by the city to more satisfactorily approach the bridge. The required widening of the channel above Keowee Street necessitates taking considerable property by the District.

The Cincinnati, Hamilton & Dayton Railroad bridges over Miami River and over Mad River must be raised to give increased waterway clearance. This work shall be done by the railroad company in accordance with Section 20 of the Conservancy Act of Ohio. The raising of the bridge over the Miami shall be completed within one year of the date of the execution of the contract for the local improvement. The raising of the bridge over the Mad River shall be completed whenever, through the progress of track elevation through Dayton or otherwise, it shall become feasible.

No bridge changes will be necessary on Stillwater River nor on Wolf Creek.

Systems of Water, Gas, and Sewerage

The general arrangement of these systems and conduits outside the channel limits need not be changed. New lines may be laid for some of the water, gas, and sewer pipes crossing the channel, as they must be lowered to conform to the elevation of the new channel grade, and as interruption in the use of the pipes in some cases would be undesirable. Minor alterations at various storm sewer outlets will be required but no change need be made either in the number or location thereof. The changes required by the enlargement of the channel will be made by the city at its own expense.

Hydraulics and Canals

Flood gates of more substantial construction than those now in use will be built on the hydraulic feeder near Focke's Station on Springfield Pike, and on the Miami and Erie Canal feeder near Findlay Street.

Maps and plans for the work at Dayton are included in Exhibit 9.

WEST CARROLLTON AND ALEXANDERSVILLE

West Carrollton is located on the east side of the Miami River about 6 miles below Dayton. The population in 1910 was 1285. Alexandersville is a small village of about 200 inhabitants, approximately a half mile northeast of West Carrollton.

The maximum discharges of the 1898 and 1913 floods passing West Carrollton were 90,000 and 250,000 second feet, respectively. Under the proposed retarding basin control, it is estimated that the greatest flood flow at West Carrollton will not exceed 125,000 second feet.

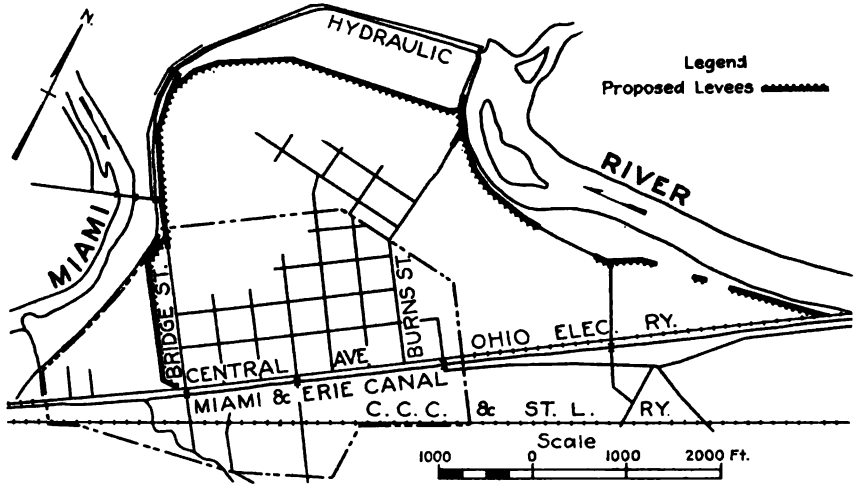


Fig. 46.—Map of West Carrollton, Ohio, showing proposed local flood protection.

The proposed local protection consists of a levee surrounding the main part of the towns. Certain small areas, as shown on the map, cannot be included within the levees at reasonable expense. The wide valley makes any enlargement of the channel unnecessary, and it is not expected that the construction of the levee will appreciably increase the water level in the river at the time of a flood.

Maps and plans for the work are included in Exhibit 10, and the location of the levee is shown on the map of West Carrollton, Fig. 46.

Levee

Beginning on the northwest side of the Miami and Erie Canal at a point about 2300 feet above the road bridge over the Canal near Alexandersville, the levee will extend westerly about 2400 feet. in-

tersecting this road at a point where it turns west along the Miami River. This road will be raised one to three feet and will be used as the levee to a point about 700 feet south of the dam across the Miami River, from which point the levee will extend westerly about 650 feet to the second bridge over the hydraulic. The road running south along the east bank of the hydraulic will be raised for about 1500 feet to form a levee to a point near the southwest corner of the cemetery. Then leaving the road, the levee will run south about 300 feet and thence parallel to Bridge Street, ending at the Cincinnati Pike.

Canal and Hydraulic

The Miamisburg and Carrollton Hydraulic passes around West Carrollton on the north and west, wholly outside of the protected area. The Miami and Erie Canal passes through the town, but is at an elevation out of reach of the river floods.

Drainage

All drainage from the territory east and south of the Miami and Erie Canal enters the canal and so is diverted from West Carrollton. As there is sufficient low land within the leveed area to store surface water temporarily during floods, no drainage is necessary for the town itself beyond the construction through the levees of culverts properly protected by flood gates.

Roads and Bridges

Except at points where sufficient space is not available the roads built up for use as levees will have a crown width of 20 feet with inclined approaches from bridges and from the adjacent roads. The bridge over the Hydraulic a few hundred feet north of the cemetery will be raised slightly.

MIAMISBURG

Miamisburg is situated on the east bank of the Miami River, about 10 miles south of Dayton. A small area of slightly improved land on the west side of the river is also included within the Corporation line. The population of Miamisburg in 1910 was 4300.

The river valley is narrower at Miamisburg than at any city below Dayton where local protection is required, and for this reason flood waters reach a greater average depth here than at other points. The estimated flow during the 1913 flood was 257,000 second feet, and during the 1898 flood about 100,000 second feet. The assumed maximum flow will be reduced by the proposed retarding basin control to about 130,000 second feet. This reduction in flow, to-

gether with the comparatively wide river channel proper in the narrow valley through Miamisburg, greatly simplifies the problem of local protection.

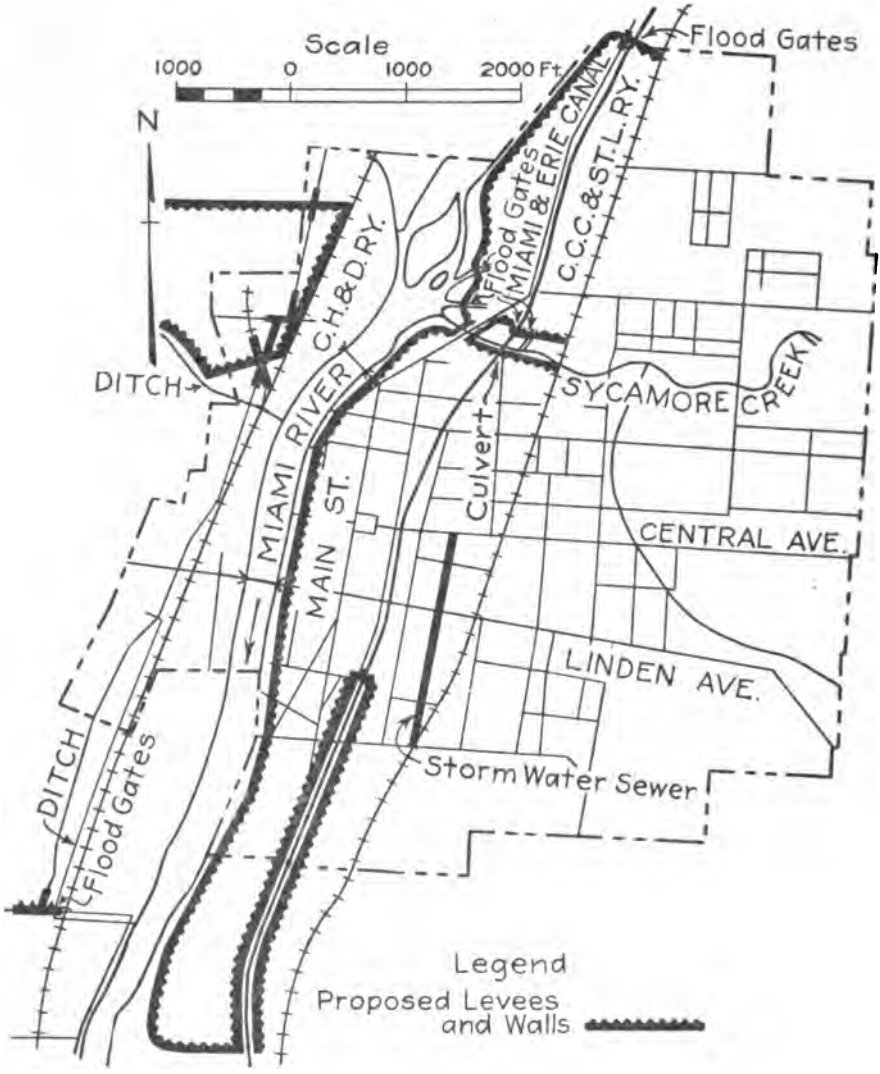


Fig. 47.—Map of Miamisburg, Ohio, showing proposed local flood protection.

The proposed local protection will consist principally of a system of levees, utilizing and extending the protection now afforded by certain railroad fills and canal banks, and a slight alteration of the storm water drainage system. To attain the condition desired, the river bed must be cleared and kept clear of trees and brush.

Maps and plans for the work are included in Exhibit 11, and the location of the levees is shown on the map of Miamisburg, Fig. 47.

Levees

The main levee will start at the high ground east of the Miami and Erie Canal at the north Corporation line, run northwest, cross the Cincinnati Pike and the Ohio Electric Railroad tracks, turn southwest and follow the river bank to a point on line with Richard Street, thence run south and along an old pond embankment, cross the tail races of the Miamisburg Paper Company and the Ohio Paper Company and reach Sycamore Creek at the Main Street bridge. The levee then will run along the north side of Sycamore Creek upstream to the Big Four tracks. Starting again at the railroad embankment, on the south side of the creek, the levee will run downstream parallel to its south bank, cross the Miami and Erie Canal and Main Street, and thence follow the river bank to the Sycamore Street bridge,. A wall about 1200 feet long will be built, south of Sycamore Street. It will follow the west side of Miami Avenue to Ferry Street as a raised sidewalk or curbing, passing adjacent to the building of the Fireproof Furniture Company, and thence along the river front. As a concrete wall will maintain its full height even if neglected, the elevation of the top may safely be reduced below that of the adjacent earth levees. From the end of the wall the levee will follow the river to a point about 1800 feet below the Corporation line, and thence will run eastward to the west bank of the Miami and Erie Canal, enclosing the site of the proposed sewage disposal plant. Below Lock Street the Canal banks will be raised sufficiently to obviate the necessity of flood gates at the levee.

On the west side of the river, the old levee north of Groendyke Company will be raised between high ground and the Cincinnati, Hamilton & Dayton Railroad embankment. The levee will continue southward adjacent to the west side of the railroad embankment to a point within 300 feet of the small creek near West Sycamore Street, thence southwesterly to the present creek levee, which will be raised and followed to high ground.

In the vicinity of and south of the Linden Avenue bridge there is an area on the west side of the river containing comparatively few buildings, most of which back on high land. Complete protection for this area would be expensive and as the present railroad embankment is within about 3 feet of extreme high water, it is proposed to use it as the line of protection by raising the lower Germantown road at the south side of the tract for a distance of about 400 feet westward from the railroad fill.

Bridges

The river at Miamisburg was spanned by two highway bridges, both of which were carried away by the 1913 flood. The Linden Avenue bridge at the lower end of the city has been replaced. It consists of three 160-foot steel trusses, and three 60-foot plate girder spans. So far as is known, no plans have as yet been prepared for the reconstruction of the bridge at Sycamore Street. These plans when made will be subject to approval by the Directors of the District who will require that the bridge be put at an elevation that will give sufficient clearance for the flood flow. This requirement will not cause important interference with the existing street grades.

Canals and Hydraulics

The Miami and Erie Canal passes through Miamisburg slightly above the general ground surface. Above Sycamore Street the flow is used largely for power by the Miamisburg Paper Company and Ohio Paper Company, each having a tail-race discharging into the Miami River, and by Grave and Webber Company whose tail-race discharges into Sycamore Creek. Flood gates will be placed in the levee where it crosses these tail-races, and where it crosses the Canal near the northern Corporation line and again north of Sycamore Creek. A culvert provided with a gate will be placed in the levee at the Canal crossing south of Sycamore Creek. Below the lock on Lock Street, the canal banks will be raised above backwater to obviate the requirement for flood gates in the levee at the canal crossing below the city.

Sewers and Drainage

The surface drainage east of the Miami and Erie Canal and south of Sycamore Street enters the storm water sewers on Central and Linden Avenues and Mound Street. To dispose of this water from the higher land during high river stages, it will be made to discharge into the Canal at Mound Street. For this purpose a sewer will be built on Third Street connecting the lines on Central Avenue, Linden Avenue and Mound Street. An overflow for the system will be constructed at the Canal on the Mound Street line, and sewer gates, which may be closed during flood periods to stop the westward flow, will be installed at the Canal on the Linden Avenue and Mound Street sewers.

In the northern part of the city, most of the hill water will drain southward into Sycamore Creek east of the Big Four railroad tracks. The other areas enclosed by the levees are reasonably free from hill drainage not provided for, and the chance of a severe local

rainstorm occurring during an extreme river flow is too small to justify providing means for disposing of such water.

Gates will be installed on the storm water sewers discharging into the river and on other drains where necessary.

A system of sanitary sewers has been proposed for the city, and plans made. The plan provides for the conveyance of the sanitary sewage of the whole city to a point near the east side of the river below the Corporation line, where a treatment plant is proposed. It is expected that the portion of the system which will be built in the near future will include a plant for pumping the sewage during high water stages.

Sycamore Creek

As shown in the description of levee location, Sycamore Creek, which has a drainage area of four square miles will be leveed from the river to the Big Four tracks. The bridge at Main Street will not be raised, but the walls along each side will be reconstructed to a higher elevation to prevent overflow at this point.

Roads and Highways

Crossings to the full height of the levee will be provided on Cincinnati Pike (Main Street) at the two extremities of the City. Fourth Street will be raised to cross the levees at Sycamore Creek within three feet of their tops.

On the west side of the river, the County Road will be raised to cross the levees surrounding the tract opposite Sycamore Street bridge.

Railroads

The Big Four Railroad will not be affected by the works, nor will the Cincinnati, Hamilton & Dayton Railroad except for a short distance where the levee will be built against the embankment, and a spur track serving Groendyke Company which will be regraded to cross the levee.

CHAUTAUQUA

On the west side of the Miami River about three miles above Franklin, the Miami Valley Chautauqua has built a settlement of about 50 cottages. These are situated on land which is from 10 to 15 feet above the ordinary river stage, while a pavilion is located on low land more exposed to the action of the river.

For the protection of this community a levee will be built following the high ground from the Big Four Railroad in a southeasterly direction, to the river bank. Thence it will continue southerly

along the river bank, ending at a point nearly opposite the most easterly of the cottages. For the greater part of its length, which is about one mile, it will be not over four feet high. The location of this levee is shown on the accompanying map of Chautauqua, Fig. 48.

The cottages will thus be protected against direct wash, and against danger of injury by the river current, but not against quiet backwater from the river. To protect the Chautauqua grounds

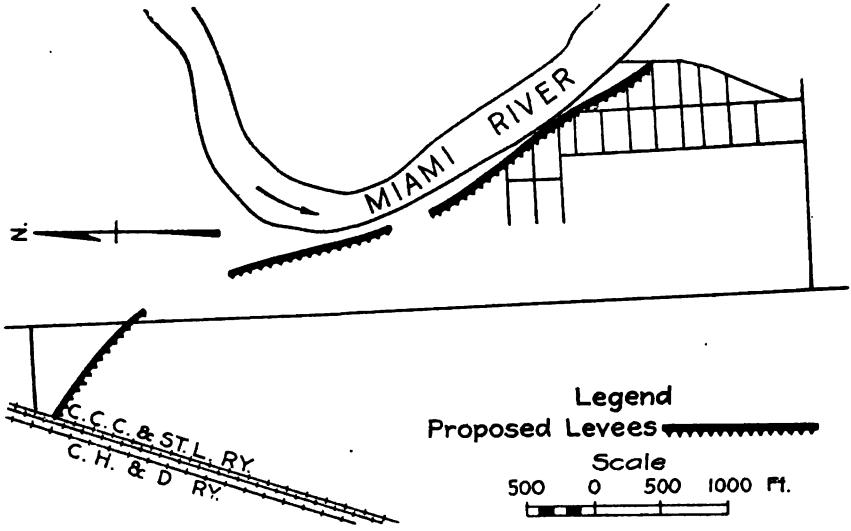


Fig. 48.—Map of Chautauqua, Ohio, showing proposed local flood protection.

from backwater would entail an expense not warranted by the low assessed valuation of the property ($35,000).

The building of the levee will necessitate the removal or inexpensive relocation of certain cottages near the river bank.

Maps and plans of the work are included in Exhibit 12.

FRANKLIN

The City of Franklin is situated on both sides of the Miami River about three miles above the mouth of Twin Creek. The population at the time of the 1910 census was 2659 inhabitants.

The assumed maximum flow in the river when controlled by the proposed system of retarding basins is 135,000 second feet, about one-half the quantity estimated as the flood discharge in 1913, or about 35 per cent greater than the 1898 flood.

The situation in Franklin is peculiar, principally on account of

the very narrow channel through the city, making protection beyond that afforded by the retarding basins comparatively difficult and costly.

The protection proposed consists of a levee system protecting all but a small and unimportant part of the low district on each side of the river. The levees will be built to the estimated elevation reached by the water surface as a result of the assumed maximum flood flow passing through the main channel, after retarding basin control is installed. This will allow the use of the overflow space west of the city as an element of additional safety to the levees.

The river velocity during flood stages will be high, but this is not considered serious, as the river banks at Franklin are very stable and have not been eroded to any appreciable extent by the high velocities which doubtless have occurred. The east bank below the suspension bridge is the most exposed stretch, being on the outside of a curve and bordering the narrow part of the channel. This bank is comparatively high, and on account of the tough soil it is believed it will resist the effects of the high velocity. Even should erosion take place at this point, the city as a whole would not suffer greatly, as the buildings are at a distance from the river's edge.

Maps and plans for the work are included in Exhibit 13, and the location of the levee is shown on the map of Franklin, Fig. 49.

Levees

The proposed levee on the east side of the river will begin at the Miami and Erie Canal at a point about 400 feet north of the northern Corporation line. It will run northwest and west to the east bank of the Franklin Hydraulic, which it will follow downstream, cross the headrace of the American Writing Paper Company's plant, and the tailrace about 750 feet below, flood gates being installed at both crossings; and then will follow the river bank to Miami Avenue where it will turn southward, thence southeasterly, crossing Center Street and Front Street near Clear Creek and continuing along the north bank of Clear Creek to the Miami and Erie Canal. The elevation of the ground surface is such that no levee will be required between Second and Fifth Streets.

On the west side of the river, Miami Avenue will be raised to form a levee from a point about 700 feet north of Carlisle Avenue to a point between Lake and Park Avenues. From this point the levee will be built along the east side of Miami Avenue and Oxford Road to within 200 feet of the Cincinnati Northern Railroad track. It will then cross Oxford Road and run west of the road to the rail-

road embankment, which will serve as a levee for about 1250 feet. Leaving the embankment at Pine Street, the levee will follow the west side of Pine Street and the south side of Forest Avenue to Chestnut Street, thence along the north side of the railroad em-

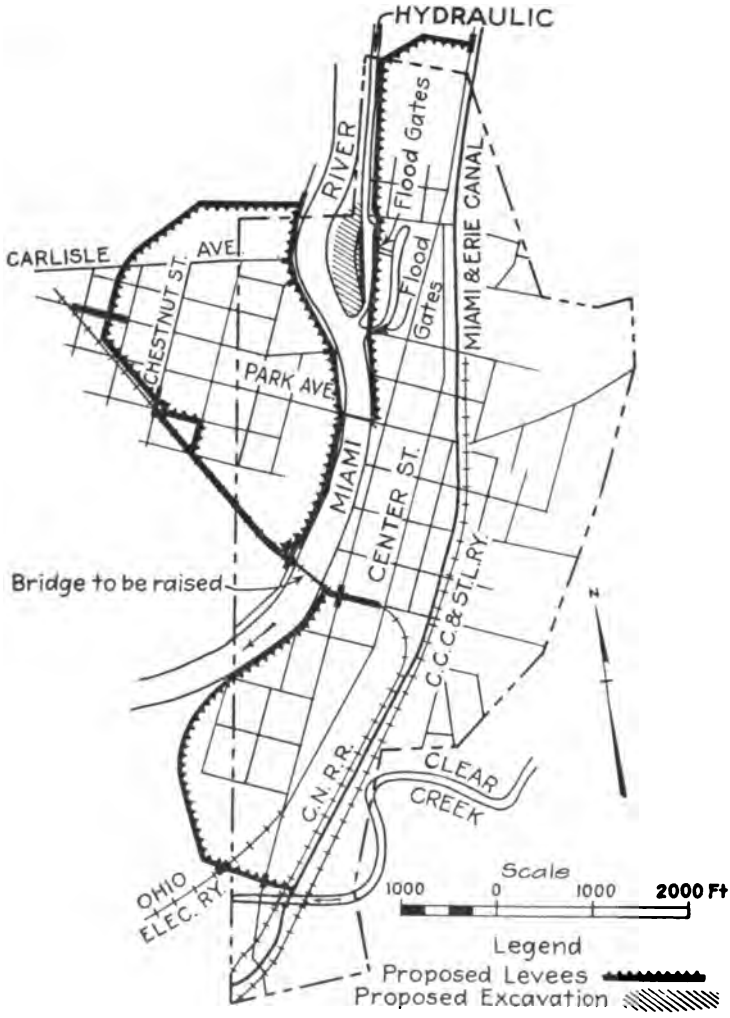


Fig. 49.—Map of Franklin, Ohio, showing proposed local flood protection.

bankment for about 1000 feet, thence northward parallel to and about 300 feet west of Cedar Street to Carlisle Avenue, and thence northeast and east to the place of beginning on Miami Avenue. The standard section of unpaved levee will be used.

Railroads

The Cincinnati Northern Railroad bridge over the Miami River will have to be raised 4½ feet to obtain sufficient waterway. Raising the railroad approaches to the bridge will have but little effect upon abutting property. This change shall be made by the Railroad Company, in accordance with Section 20 of the Conservancy Act of Ohio, and shall be completed withon one year from the date of the execution of the contract for the main part of the levee construction at Franklin.

The Cincinnati, Dayton & Toledo Traction Company's track (operated by The Ohio Electric Railway Company) will be raised for a short distance at each of the two levee crossings, 4 feet at the north end of the city and 2 feet at the south. These changes shall be made by the Traction Company within one year from the date of the execution of the contract for the adjoining levees.

Highways and Highway Bridges

No change will be made in the highway suspension bridge at Second Street.

At five places, streets crossed by the Franklin levees will be graded to pass over the levee at its full height. These crossings will be: On the east side, Front Street at both ends of the city; on the west side, Lake Avenue, Chestnut Street, and Oxford Road.

Clear Creek

This stream, with a drainage area of 51 square miles, enters the river from the east immediately below the City. Although the 1913 flood water backed up into this stream to a small extent, the chief cause of its flooding was due to its own flow rather than to water from the river. The overflow, however, caused but little damage and there seems to be no reason to justify the expense of controlling this water course.

Canals and Hydraulics

The Miami and Erie Canal is at such an elevation as to be unaffected by the floodwater or by the proposed protection at Franklin.

At the plant of The American Writing Paper Company, the west bank of the hydraulic, at its lower end, projects into the river and deflects the river current to the west side of the channel, where the county has recently constructed a river wall. It is proposed to remove and rebuild this bank about 100 feet east of its present position, with a better alignment, and to remove the pro-

jection into the river channel. The new bank will be protected against erosion. Flood gates will be built in the levee where it crosses both the head race and the tail race of The American Writing Paper Company's plant.

Sewers and Drainage

The Miami and Erie Canal intercepts all storm water draining from the hills east of Franklin, leaving only that falling within the levee enclosure to be considered. At present there is no general system of drainage, and the possibility of sufficient storm water falling to cause damage within the leveed area during an extremely high river stage is so remote that provision for its storage or for pumping seems unwarranted.

Where necessary, gates will be installed on present drain pipes, and such other storm water outlets as will be needed will be built through the levees.

MIDDLETOWN AND WEST MIDDLETOWN

The greatest flow at Middletown during the 1913 flood was about 300,000 second feet. By means of reservoir control this will be reduced to about 160,000 second feet, and the local improvement will complete the protection of the city.

The contemplated local improvement consists of a levee system which will protect the city on the east side of the river, and the village of West Middletown on the west, leaving a large space between for the river flow. Maps and plans for the work are included in Exhibit 14, and the locations of the levees are shown on the map of Middletown, Fig. 50.

Levees

The levee for the protection of Middletown is designed to start at a point near Tytus Avenue about 450 feet east of the Poasttown Road. From this point the levee runs northward to the south bank of the Miami and Erie Canal which it then parallels to Tytus Avenue near Clark Street. At this point flood gates will be built in the Miami and Erie Canal.

As the buildings of the City Pumping Station, Oglesby Paper Company, Middletown Milling Company, Bevis Machine Shops, Gardner Paper Company, and others between, are located on land which is at nearly all points above the future high water line, no levee need be built along this section of the river front.

Another section of the levee, beginning at the lower end of the Hydraulic, will curve to the right, cross the lower end of Fifth

Street, and run in a southerly direction approximately parallel to Main Street to Eighth Street. From there it will follow the west side of Maple Street to the north wall of the pumping station of the American Rolling Mill Company near Eleventh Street. From the south wall of the pumping station the levee will run southward to the point where the Ohio Electric Railway leaves Main Street (Cincinnati Pike), thence will continue southward along the west side of Cincinnati Pike for a distance of about 2200 feet, and thence

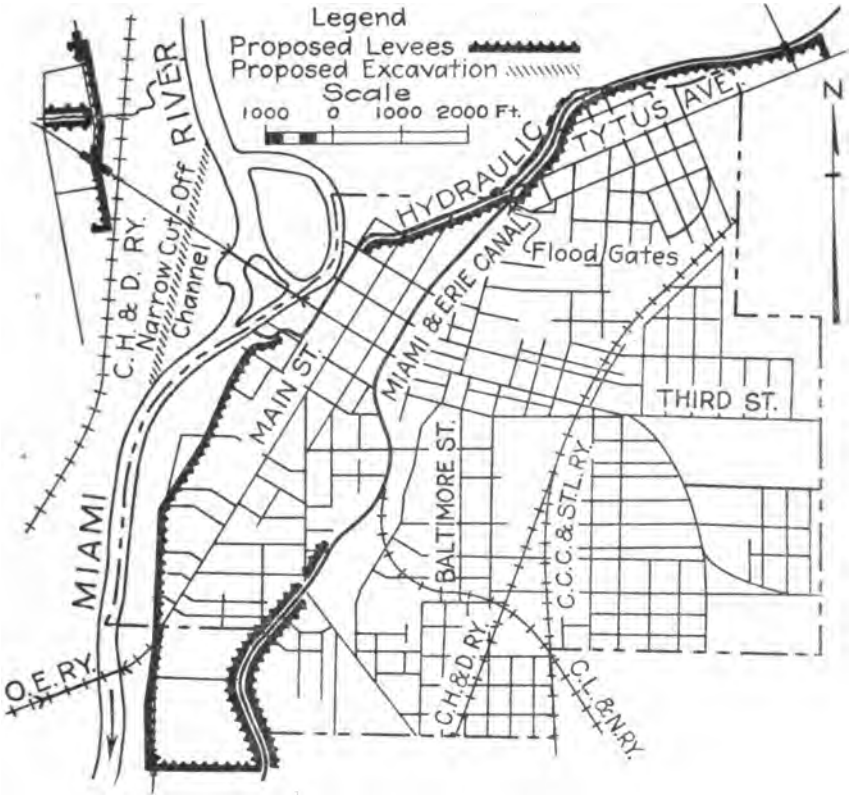


Fig. 50.—Map of Middletown, Ohio, showing proposed local flood protection.

directly east to the high ground at the Miami and Erie Canal. The canal bank north of the levee will be raised sufficiently to eliminate the requirement for a flood gate in the canal at this point.

For the protection of the residence district in West Middletown a levee is proposed along the east side of the first road west of the Cincinnati, Hamilton and Dayton Railroad, for a distance of about 1500 feet, and running west to the high land at the northerly and southerly limits of this length.

Bridges

The new concrete County bridge of 18 spans and over 1600 feet long, has ample waterway, though the arches are somewhat low, Its length makes possible a straightening of the river, and to assist the river in carrying out this work, a cut-off channel, 50 feet wide at the bottom and as deep as the river channel, will be constructed across the bend.

Sewers

No change will be made in the existing sewer system except to provide gates at outlets where necessary to prevent entrance of the river water into the city through the sewers.

HAMILTON

The maximum river discharge at Hamilton during the 1913 flood was approximately 350,000 second feet, the water surface reaching a stage that would correspond to a gage height of 34.0 feet at the High-Main Street bridge.

After reservoir control is effective, the greatest flow to be provided for at Hamilton will be about 200,000 second feet. With the improved channel the maximum flood level will be reduced to about the stage of the 1898 flood, or 23.3 feet, on the gage at High-Main Street.

The proposed improvement at Hamilton, together with the retarding basins, will protect the city from a flood greater than that of 1913. It is of a permanent character, and will allow the material excavated from the river channel to be used advantageously in filling low land. The levees and spoil banks are to be located so as not to restrict the growth of the city, but rather to favor an extension of both the residence and the business sections.

In general, the local improvement will consist of deepening and widening the channel and bringing it to regular lines, building and raising levees, and protecting the channel against erosion. Levees, where used, will be of the standard section, having a top width of 8 feet. The side slopes for the upper 10 feet will be 2 to 1, and for the lower part, where levees are more than 10 feet high, will be 2½ to 1. The slope of the improved river banks will be 1½ or 2 feet horizontal to each foot of vertical height, depending upon the material encountered and whether or not paving will be used. From the foot of the side slopes or walls the wide bottom of the improved channel will slope gradually downward to a narrower flat bottom, which will be 150 feet wide, and 8 feet below the toe of the side slopes. To reduce the amount of excavation and to approach natural channel

conditions, the deeper part of the bottom will follow, so far as practicable, the low course of the present channel.

Excavation will commence a short distance below Two Mile Creek, and extend downstream to a point about 1900 feet below South Street, a total distance of 2¼ miles.

Maps and plans for the work are included in Exhibit 15, and its location is also shown on the map of Hamilton, Fig. 51.

Proposed Channel Improvement

There will be a change in the grade of the channel at a point about 1,000 feet below the High-Main Street bridge. Above this point the grade will slope 0.08 per cent, or about 4 feet to the mile, and below the point, 0.05 per cent, or about 2½ feet to the mile. The elevation of the channel bottom at this change in grade will be about 556.6 feet. The greatest depth of water during flood flow will be 32 feet at the upper end of the improved channel, decreasing to 31 feet at the lower end. The freeboard, or height of banks above maximum river stage, will be from 3 to 5 feet, except at the north end of the city where a much greater freeboard is provided, and also, as noted later in a description of the levee near Two Mile Creek, where one foot of freeboard is provided for a small and comparatively unimportant area. The left or east bank will have 4 feet of freeboard above High-Main Street bridge. From the gas tank easterly to the railroad a freeboard of 5 feet, and from the railroad east to the high ground, a freeboard of more than 5 feet will be provided. Below the High-Main Street bridge, the freeboard will be not less than 3 feet.

The cross section at the upper end of the improved channel, 1100 feet above Black Street, will conform in shape to the natural channel. Within a stretch of 400 feet below this point the shape will be changed to the form of cross section previously described, having a bottom width of 620 feet, which will be reduced gradually to 520 feet at the Champion Coated Paper Company's works. To avoid heavy encroachment on valuable property, this bottom width of 520 feet must be continued downstream to the High-Main Street bridge, with the exception of a short length at the Black-Clawson Foundry, which will have an equivalent area, with walls instead of side slopes.

From the High-Main Street bridge to the Cincinnati, Hamilton & Dayton Railroad bridge the section of the channel will be widened gradually to a bottom width of 620 feet, this width being maintained to the lower end of the improvement, about 1900 feet below South Street.

Protection for the excavated channel will be provided on both banks from a point about 700 feet above Black Street to a point a short distance above the Cincinnati, Hamilton & Dayton Railroad bridge, and on the right (west) bank, will continue downstream to

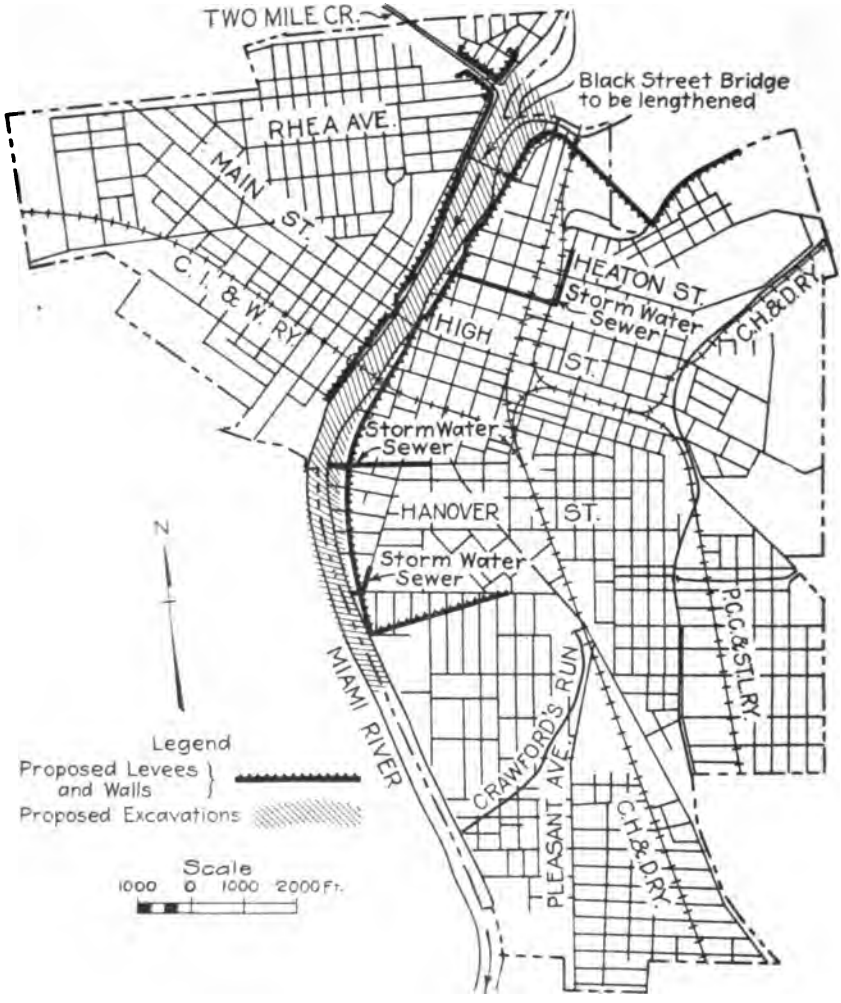


Fig. 51.—Map of Hamilton, Ohio, showing proposed local flood protection.

a point opposite Washington Street. On the east side of the channel the slopes of the bank and levees will be paved to the top with reinforced concrete, and on the west side to a few feet above the low water line. A heavy, flexible mat of reinforced concrete blocks securely fastened together, which will conform to changes in the

channel bed, will be laid on the bottom extending 30 to 40 feet from the foot of the slope pavement towards the center of the river, except where local conditions make desirable a modification of this form of protection. The slopes will be grassed above the concrete revetment, and at other places where they do not require concrete revetment.

At the High-Main Street bridge the channel bed will be protected against further scouring below a safe depth by means of sheet piling. The piling will be so driven as to allow scouring or excavation to a depth which would result in a waterway approaching the size of the channel above and below the bridge. This is about the extent to which scouring occurred as a result of the 1913 flood.

A similar bed protection of piling is proposed at the northern end of the improved channel where its bed will merge into the bottom of the natural channel above.

There will be approximately 2,000,000 cubic yards of material excavated from the river through Hamilton. Part of this will be used in building and raising the levees, and the surplus will be placed, so far as can be done without serious extra expense, to effect the most benefit to the City of Hamilton, and to the District. Where not prevented by valid objections, some of the low land within reasonable distance of the channel may be raised to a level above the maximum flood stage to be expected in the river.

Levees

On the east side of the river a levee having 10 feet of freeboard will start at the left bank of the Hydraulic on the unoccupied property of the St. Stephens Cemetery, and will run in a westerly direction along the Hydraulic to a point near Miami Avenue, thence northwesterly to the south side of the railroad bridge over Old River. Thence a levee with a freeboard of 5 feet will follow the south bank of Old River, running north of the gas tank, to the improved river channel. To maintain satisfactory track crossings, a gap with about 2 feet of freeboard will be left in the levee where it crosses the Cincinnati, Hamilton & Dayton Railroad and the Pittsburgh, Cincinnati, Chicago and St. Louis Railroad, near Old River bridge, and where the levee crosses Third Street. The levee, with a 4-foot freeboard, will continue along the left bank of the channel to the High-Main Street bridge. From this bridge south to the south end of George Street, and thence northeast to the junction of Paoli and South Streets, a levee with a freeboard of 3 feet will be built.

On the west side of the river a levee with one foot of freeboard will be built to protect a small area north of Two Mile Creek and west of Seven Mile Pike. From a point west of Summer Avenue and between Webster Street and the railroad yard near Two Mile Creek, a levee with 3 feet of freeboard will be constructed adjacent to the belt line track of the Cincinnati, Hamilton & Dayton Railroad, to the Champion Coated Paper Company's mill. Below the Paper Company's building a levee with 3 feet of freeboard, will be built along the west side of the channel. A gap down to the high water stage will be left in the levee to keep a satisfactory crossing at Seven Mile Pike, and another for the Belt Line Railroad track to cross the levee below the Champion Coated Paper Company's mill. A gap with over one foot of freeboard will be left to allow the Belt Line Railroad track to cross the levee near Black Street. The sills of windows and doors in the east wall of the Champion Coated Paper Company's building that serves as a part of the levee system are slightly above the extreme high water stage.

The levees will be of the standard section before described. In a few minor cases, because of lack of space, a wall will be required.

Bridges

The Cincinnati, Hamilton & Dayton Railroad bridge on Miami River above the mouth of Four Mile Creek will be raised to provide clear waterway to elevation 600. This shall be done by the Railroad Company, in accordance with Section 20 of the Conservancy Act of Ohio, and shall be completed within one year from the date of the execution of the contract for the principal channel improvements at Hamilton.

It will be necessary for the City of Hamilton to lengthen the foot bridge at Black Street to the width of the excavated channel. The reconstruction shall be completed within three months from the date of the execution of contracts by the District covering the adjacent channel improvement.

The recently constructed concrete arch bridge connecting High and Main Streets will remain unaltered. Its length (501 feet) is less than desirable, but the deep pier footings will allow local deepening of the channel at the bridge to obtain increased waterway. The narrow waterway at this bridge is one of the factors necessitating the restricted width of the channel approaching the bridge from above.

The Cincinnati, Hamilton & Dayton Railroad bridge, downstream from the High-Main Street bridge, is long and has ample clearance, so that no changes in it are necessary.

Future bridge structures affecting the Hamilton improvement are subject to approval by the District and will, therefore, be built according to requirements. Plans for the Columbia concrete arch bridge, approached by Wood and Chestnut Streets, are nearing completion by the County and, in so far as they relate to the problem of flood control, have been approved by the Board of Directors.

Railroads

The Cincinnati, Hamilton & Dayton, and the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad tracks leaving the city at the north are at an elevation just above the possible maximum high water. They should be raised to elevation 595, at the levee crossing south of Old River, to provide a safe freeboard. The bridge over the Miami River just to the north must be raised as noted above. The Belt Line of the Cincinnati, Hamilton & Dayton Railroad which serves the Champion Coated Paper Company on the west side of the river must be adjusted slightly to permit the construction of the levee to the proper elevation.

Four Mile Creek

Four Mile Creek will be relocated near its mouth to eliminate the disturbance in the Miami River below the railroad bridge which now occurs during high water periods, due to the upstream direction of the current from the creek.

Canals and Hydraulics

The Miami and Erie Canal is sufficiently high to be unaffected by the changes which will be made in the river channel at Hamilton.

The original use of the Hamilton and Rossville Hydraulic has been gradually decreasing. Channel widening will require the land now occupied by the Hydraulic below Vine Street, and also the site of the hydro-electric power station at the foot of Buckeye Street, which at the present time uses over three-fourths of the flow. If the station is relocated north of Little Reservoir the full flow may be delivered to it after the remaining portion of the hydraulic has been abandoned. This plan would be feasible because the additional cost of building levees and control works to maintain the remainder of the hydraulic below Little Reservoir and to prevent danger during floods would be considerably greater than any possible slight difference in the amount of power obtainable at the two locations.

The necessary change will relieve the Hydraulic Company of the expense of maintaining a considerable length of canal and

various regulating devices. The City will be benefited by the removal of the Hydraulic and will secure increased protection. An estimate of the damage to the Hamilton and Rossville Hydraulic Company is included in the estimate of the cost of the Plan.

Sewers

North of High Street and east of Third Street, there is a territory in which the present storm water sewers discharge into the tailrace which runs northerly to Old River. To allow the abandonment of the hydraulic and its tailrace, and to lower the discharge level during flood periods, an intercepting storm water sewer will be built south on Fifth Street from Vine Street to Buckeye Street, thence west on Buckeye Street to the river. Those lines now discharging into the tailrace will be connected to this intercepting sewer. It is estimated that the maximum river stage at the proposed outlet on Buckeye Street will be at elevation 588.5 feet, or 4.5 feet lower than at the present tailrace outlet at Old River.

In the central part of the city there is an area of about 132 acres served by a storm water sewer discharging into the river at Wood Street. A storm water sewer will be built on Wood Street from Second Street to the river to drain by gravity during extreme river stages, the 106 acres of this territory lying above elevation 586 feet.

South of the district drained by the system discharging at Wood Street, and north of South Street, is an area served by a storm water sewer on Front Street which discharges into the old channel of Crawford's Run. The levee will shut off this outlet to the river, and to take its place a line will be constructed to the river along Front Street to drain the Front Street sewer and the old Crawford's Run drainage area. The elevation of the maximum flood stage to be expected at this outlet is about 585 feet. The area drained covers 112.5 acres.

Most of the remaining area north of South Street lies above all but the most severe floods. With the retarding basin control, in case of a storm considerably greater than that of 1898, only a small area would be below the level of the extreme flood stage in the river. The only damage by water to this lower territory would result from rain falling within its own boundary. The probability of a heavy rain at Hamilton occurring at the time when the maximum flow from the watershed above has reached the city is so remote, that further expense for the storm water sewer system is not warranted.

On the west side of the river, with minor exceptions, the ground will be at an elevation sufficiently high to be practically safe from

damage. The low areas are so small that storm water may be allowed to collect on them during rare intervals, if rain should fall during the higher river stages.

Drains provided with gates will be placed through the levees on both sides of the river where necessary to drain off storm water which would otherwise collect behind the levees.

East of the river, the present sanitary sewer system delivers all sewage to one outlet near South Street. A pumping station has been built at this point and is used during the high stages of the river, probably not more than once or twice each year. No changes will be necessary to this system.

Nearly all of the sanitary sewer system on the west side of the river lies sufficiently high to be unaffected by flood stages of the river. Over the lower areas on the west side the flood stage is above the basement floors of houses nearest to the river, but generally below ground surface. Over this small area the impounding of sewage in the low level sewers at intervals of many years will not be seriously objectionable. The district north of Black Street is now provided with a few isolated sewers, some of which were built by private parties, and for present requirements gates at the outlets will handle the situation.

An intercepting sanitary sewer for the part of the city on the west side of the river has been under consideration by the city and by the State Board of Health. When this is built the city may deem it advisable to install a pumping station as it has done on the east side of the river.

Gates will be placed on the outlets of such sanitary sewers as are endangered by back flow from the river, for use until an intercepting sewer and pumping station are constructed.

No change will be required in the present waterworks system except to lower the pipe crossing the river at Black Street.

VENICE

The village of Venice is located about three-fourths of a mile west of the Miami River, and about 9 miles below Hamilton. The population in 1910 was 182. The reduction in flood stage due to retarding basin control will to a large extent relieve the community of flood damage. This protection will be complete except in case of great floods, and in such case the damage would be greatly reduced over what it has been in the past. No local protection to supplement retarding basin control is planned for this place, as the cost of the additional protection would far exceed the benefits derived. Such additional protection, if provided, would consist of a levee completely surrounding the village.

NEW BALTIMORE

New Baltimore is located on a hill on the west side of the Miami River about 14 miles below Hamilton. The population in 1910 was 280. All houses but about 3 or 4 on the river bank are above high water, and no protection, in addition to retarding basin control, is deemed necessary.

MIAMI

(Known as Miami Town)

Miami is located on the west side of Miami River opposite Taylor Creek, and about 16 miles below Hamilton. The population in 1910 was 284. Only a very few houses are reached by flood stages of the river, and their value does not warrant special protection. Relocation on higher land, if necessary, would be preferable.

CLEVES

Cleves is located on the east bank of the Miami River about 5 miles above its mouth. The population in 1910 was 1423. The village is situated on a hillside, and but comparatively few houses within a small district are within reach of high water.

Protection of this district beyond that obtained by retarding basin control would not be warranted by the additional benefits derived. Flood stages at Cleves are affected more by backwater from the Ohio River than by floods in the Miami River. During the 1913 flood the bridges over the Miami River near Cleves were destroyed, and a number of houses were wholly or partially destroyed by the swift current. With retarding basin control the current in the Miami would have been less, and a large part of the damage due to swift currents would have been prevented. Damage due to backwater from the Ohio would have been about the same.

BRIDGES AND OTHER STRUCTURES REQUIRING MODIFICATION AT OWNERS' EXPENSE

The following modifications of bridges and other structures are required by the Plan, and, under Section 20 of the Conservancy Act of Ohio, shall be made at the owners' expense, and within a specified time, as herein stated under each item.

Piqua

Simultaneously with the progress of the channel improvement work in the City of Piqua, all water and gas mains, storm and sanitary sewer outlets, and other similar structures, within the lines of the new channel as shown in the Plan, shall be so changed and adjusted as satisfactorily to clear the lines of said new channel.

Troy

Within one year from the date of the execution of the contract for the main channel improvement in the City of Troy, the Market Street bridge, including the Springfield, Troy and Piqua Electric Railway Company's bridge adjoining the highway bridge, shall be so raised or reconstructed that the bottom clearance line of the steel shall not be below elevation 834, and the length from abutment to abutment shall not be less than 440 feet.

Dayton

Simultaneously with the progress of the channel improvement in the City of Dayton, all water and gas mains, and all storm and sanitary sewer outlets and other structures within the lines of the new channel for the Miami River and Wolf Creek, as shown in the Plan, shall be lowered, removed, or adjusted so as not to project within the limits of said new channel.

Within twelve months from the execution of the contract for the main channel improvement in the City of Dayton, the Cincinnati, Hamilton and Dayton Railroad Company's bridge across the Miami River just north of the City of Dayton shall be raised so that the bottom clearance line of the steel shall not be below elevation 759.

The Cincinnati, Hamilton and Dayton Railroad Company's bridge over Mad River in the City of Dayton shall be raised or re-

constructed so that the bottom clearance line of the steel shall not be below elevation 751.5. But since the approach to this bridge from the south is already on a steep grade, and since it is not feasible to change this grade without a general scheme of track elevation and grade separation through the city, it appears impracticable to raise this bridge until the general scheme for track elevation and grade separation for the City of Dayton is carried out, at which time this bridge shall be made to conform to the requirements of the Plan as stated above.

Franklin

Within one year from the date of the execution of the contract for the local protection works in the Village of Franklin, the bridge of the Cincinnati Northern Railroad Company, across the Miami River in the Village of Franklin, shall be raised or reconstructed so that the bottom clearance line shall not be below elevation 681.5.

The concrete walls extending into the river channel on the east bank within the corporate limits of the Village of Franklin shall be removed within one year from the date of the execution of the contract for the local protection works in the village.

Middletown

At the time of the reconstruction of the spans of the Ohio Electric Railway Company's bridge, south of the City of Middletown, which were washed out during the flood of March, 1913, the entire bridge shall be so reconstructed or raised that the bottom clearance line of the steel shall not be below elevation 645.

Hamilton

Within three months from the date of the execution of the contract for the main channel improvement in the City of Hamilton, the following structures shall be modified or removed so as satisfactorily to clear the new channel described in the Plan:

(a) Black Street foot bridge to be lengthened.

(b) Water main across river at Black Street, and all other water or gas mains within the limits of the cross section of the new channel described in the Plan, to be lowered or removed.

Simultaneously with the progress of the channel improvement, all sewer outlets and other structures shall be adjusted to the lines of the new channel described in the Plan.

Within one year from the date of the execution of the contract for the main channel improvement in the City of Hamilton, the

bridge across the Miami River north of the City of Hamilton, and used jointly by the Cincinnati, Hamilton and Dayton Railroad Company, and the Pittsburg, Cincinnati, Chicago and St. Louis Railway Company, shall be raised or reconstructed so that the bottom clearance line of the steel shall not be lower than elevation 600.

RAILROAD CHANGES REQUIRED ON ACCOUNT OF LEVEE CONSTRUCTION

The following adjustments of railroad grades are required on account of levee construction for the local protection of cities, as shown in the Plan. Each change shall be made within the time specified for that item as provided in Section 20 of the Conservancy Act of Ohio. An estimate of the cost of each change has been made, and has been included in the cost of the Plan as a part of the estimated damages. The railroad company, in each case, will be allowed to effect the change by any method it may desire, provided the requirements of the Official Plan are complied with.

Each of the changes hereinafter described can be made without exceeding the present maximum ruling grade for the division wherein that change lies, and without in any way working an undue hardship on the railroad company. In the following descriptions, wherever the elevation of a track or tracks is mentioned, the elevation of the sub-grade of such a track or tracks is meant.

Troy

The tracks of the Dayton and Troy Electric Railway shall be raised to elevation 837.5 at the crossing of the levee in the north end of the City of Troy as shown in the Plan. This change shall be made simultaneously with the reconstruction of Elm Street at this point.

Miamisburg

The spur track of the Cincinnati, Hamilton and Dayton Railroad Company, leading to the Groendyke Company's plant in the northwest portion of the City of Miamisburg, shall be raised at its crossing of the proposed levee as shown in the Plan to elevation 709. This change shall be made during the construction of this levee.

The tracks of the Ohio Electric Railway Company shall be raised to elevation 705 at its crossing of the proposed levee at the south end of the City of Miamisburg, as shown in the Plan. This change shall be made simultaneously with the reconstruction of the Cincinnati Pike at this point.

The tracks of the Ohio Electric Railway Company shall be raised to elevation 711 at its crossing of the proposed levee in the north end of the City of Miamisburg, as shown in the Plan. This change shall be made simultaneously with the reconstruction of the levee at this point.

Franklin

The tracks of the Ohio Electric Railway Company in the Village of Franklin at the crossing of the proposed levee near Clear Creek, as shown in the Plan, shall be raised to elevation 676. This change shall be completed within three months from the date of the execution of the contract for the local protection works for the Village of Franklin.

The track of the Ohio Electric Railway Company, at the proposed levee crossing at the north end of the Village of Franklin, as shown in the Plan, shall be raised to elevation 687. This change shall be made at the time of the reconstruction of the Cincinnati Pike at this point.

Middletown

The spur track of the Cleveland, Cincinnati, Chicago and St. Louis Railway Company, on Hydraulic Street, between Broad Street and First Street in the City of Middletown, shall be raised about two feet simultaneously with the construction of the levee at this point, and at the same time the tracks of the Ohio Electric Railway Company, at its crossing of this spur track on Hydraulic Street, shall be raised to the new elevation of this spur track as described above.

Hamilton

The tracks of the Cincinnati, Hamilton and Dayton Railroad Company, and the Pittsburg, Cincinnati, Chicago and St. Louis Railway Company, shall be raised at the levee crossing south of Old River in the City of Hamilton to elevation 595. This will probably require the readjustment of the present grade for about 500 feet north, and about 1000 feet south, of Old River. The change shall be completed within one year from the date of the execution of the contract for the main channel improvement in the City of Hamilton.

The Belt Line of the Cincinnati, Hamilton and Dayton Railroad which serves the Champion Coated Paper Company on the west side of the river shall be adjusted to permit the construction of the levee to the proper elevation, within one year from the date of the execution of the contract for the main channel improvement in the City of Hamilton.

THE MIAMI AND ERIE CANAL

The Miami and Erie Canal has been damaged seriously by floods in the past. The execution of the Plan will to a large extent prevent the possibility of further flood damage, and will make possible a crossing of the Miami River under far more favorable conditions than exist at present. Where the Canal enters and leaves cities it now constitutes a menace, as it provides a means of entrance for flood waters. In the execution of the Plan, it will be necessary to provide gates across the Canal at certain points, which can be shut when necessary to prevent flood waters from entering the various cities. These and other similar changes have been provided for in a formal agreement between the State and The Miami Conservancy District.

STATE OF OHIO

THE MIAMI CONSERVANCY DISTRICT

REPORT OF THE CHIEF ENGINEER

ARTHUR E. MORGAN

SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

IN THREE VOLUMES

Volume II

DAYTON, OHIO

MARCH, 1916

REPORT OF THE CHIEF ENGINEER OF THE MIAMI CONSERVANCY DISTRICT, SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

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Letter of Transmittal

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VOLUME III

Part V. —Contract and Specifications

Part VI.—Estimates of Quantities and Cost

Two volumes of Exhibits, containing 408 drawings, accompany this report, but have not been published in a form available for general distribution.

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PART IV

PROPERTY AFFECTED BY THE PLAN

INTRODUCTORY

The property that will be affected by the Plan of The Miami Conservancy District is divided into two groups: first, the property to be damaged or taken; and second, that to be benefited. Practically all of this property is within the present limits of the District, but a small portion is outside and is classified separately.

All the property affected by the Plan is, therefore, described under three main headings as follows:

Property Within the District to be Damaged or Taken
Property Within the District to be Benefited.
Property Outside the District which will be Affected.

In the descriptions of this property, the definitions and abbreviations listed hereinafter have been used, and are hereby made a part thereof.

DEFINITIONS

Miami River.—Wherever the term Miami River is used it refers to the Great Miami River.

Center Line of Miami River.—In descriptions of real estate lying in fractional sections bordering the Miami River, the term center line, as applied to the river, means the center line as located and determined at the time of the original United States Government Survey of the sections and townships involved.

Fractional Section Lines.—Wherever a fractional section line is referred to within the banks of the Miami River, it is taken as the described fractional section line extended.

Bearings.—Wherever bearings are used they refer to true north.

ABBREVIATIONS

1st P. M. for First Principal Meridian.

M.R's for Between Miami Rivers, East of the Great Miami. (This refers to Symmes Purchase and other lands between the Great Miami River and the Little Miami River.)

T for congressional township.

R for range.

F R for fractional range.

N for north.

S for south.

E for east.

W for west.

NE for northeast.

ABBREVIATIONS—(Continued)

NW for northwest.
SE for southeast.
SW for southwest.
° for degree, degrees.
′ for minute, minutes (angle measurement).
Sec. for section.
Frac. Sec. for fractional section.
M. & E. Canal for Miami and Erie Canal.
B. & O. S. W. R. R. Co. for The Baltimore and Ohio Southwestern Railroad Company.
C & O. Ry. Co. for The Chesapeake and Ohio Railway Company of Indiana.
C. C. C. & St. L. Ry. Co. for The Cleveland, Cincinnati, Chicago and St. Louis Railway Company.
C. H. & D. Ry. Co. for The Cincinnati, Hamilton and Dayton Railway Company (Now in the hands of the Receivers, Judson Harmon and Rufus B. Smith, by appointment in the United States District Court for the Southern District of Ohio); and operating what was formerly:
C. & D. Ry. Co. for The Cincinnati and Dayton Railway Company.
C. I. & W. Ry. Co. for The Cincinnati, Indianapolis and Western Railway Company.
C. L. & N. Ry. Co. for The Cincinnati, Lebanon and Northern Railway Company; and operating:
D. L. & C. R. R. & T. Co. for The Dayton, Lebanon and Cincinnati Railroad and Terminal Company.
C. N. R. R. Co. for The Cincinnati Northern Railroad Company.
P. C. C. & St. L. Ry. Co. for The Pittsburgh, Cincinnati, Chicago and St. Louis Railway Company.
Nypano R. R. Co. (Erie R. R. Co.) for The Nypano Railroad Company (Erie Railroad Company).
C. L. & A. El. R. R. Co. for The Cincinnati, Lawrenceburg and Aurora Electric Street Railroad Company.
D. & T. El. Ry. Co. for The Dayton and Troy Electric Railway Company.
D. C. & P. Tr. Co. for The Dayton, Covington and Piqua Traction Company.
D. S. & X. S. Ry. Co. for The Dayton, Springfield and Xenia Southern Railway Company.
L. & F. Tr. Co. for The Lebanon and Franklin Traction Company.
M. & L. Ry. Co. for The Minster and Loramie Railway Company.
O. E. Ry. Co. for The Ohio Electric Railway Company; and operating:
C. D. & T. Tr. Co. for The Cincinnati, Dayton and Toledo Traction Company; and operating also what was formerly The Dayton, Springfield and Urbana Electric Railway Company.
Ohio Tr. Co. for The Ohio Traction Company; and operating:
C. & H. Tr. Co. for The Cincinnati and Hamilton Traction Company.
S. T. & P. Ry. Co. for The Springfield, Troy and Piqua Railway Company.
W. O. R. R. Co. for The Western Ohio Railroad Company.

PROPERTY WITHIN THE DISTRICT TO BE DAMAGED OR TAKEN

Lands now within the limits of The Miami Conservancy District, in all cases including all public and private property, rights, franchises, and public utility holdings thereon, which may be damaged by the works of the District, or which it may be necessary for the District to take for the purposes of the District, are located and described as follows:

MIAMI RIVER

All of the bed, banks, and islands of the Miami River, within the limits of The Miami Conservancy District, together with all riparian rights included therein, lying S of the N line of Miami County.

GERMANTOWN RETARDING BASIN

Lands now within the limits of The Miami Conservancy District which may be damaged or which it may be necessary for the District to take for the purposes of the District by reason of the construction of the Germantown Retarding Basin are located in Montgomery and Preble Counties as follows: (Refer to Sheets Nos. 1, 2, 3, 4, and 5 of Exhibit No. 5, which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located in German and Jackson Townships as follows:

GERMAN TOWNSHIP

Such lands in T 3 N, R 4 E, 1st P. M., German Township, are located in Sections 3, 4, 5, 6, 10 and 11 as follows:

Section 3

The following lands in Sec. 3, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 3; thence E 290 feet along N line of said section; thence S 2° 55′ W 700 feet; thence N 55° 30′ W 310 feet more or less to point on W line of said section; thence N 530 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 3, 805 feet S of NW corner thereof; thence S 58° 30′ E 210 feet; thence S 19° 30′ E 530 feet; thence S 89° 45′ W 115 feet; thence N 18° 40′ W 185 feet; thence N 73° 15′ W 190 feet more or less to point on W line of said section; thence N 385 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 3; thence N 2200 feet along W line of said section; thence S 34° 30′ E 680 feet; thence N 89° 55′ E 245 feet; thence S 7° 30′ E 500 feet; thence S 40° 20′ E 480 feet; thence S 2° 30′ W 135 feet; thence S 45° 30′ E 355 feet; thence S 20° 00′ E 285 feet more or less to point on E line of W ½ of SW ¼ of said section; thence S 135 feet more or less along said E line to point on S line of said section; thence W 1350 feet more or less along S line of said section to place of beginning.

Section 4

The following lands in Sec. 4, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 4; thence E 5325 feet more or less along N line of said section to NE corner thereof; thence S 5395 feet along E line of said section; thence N 59° 15′ W 225 feet; thence S 7° 15′ W 280 feet; thence N 83° 00′ W 165 feet; thence N 8° 00′ E 540 feet; thence N 36° 45′ E 145 feet; thence N 32° 30′ W 495 feet; thence N 22° 30′ W 960 feet; thence N 70° 30′ W 60 feet; thence N 11° 25′ W 695 feet; thence N 85° 10′ W 465 feet; thence N 34° 30′ W 210 feet; thence S 81° 30′ W 200 feet; thence N 43° 15′ W 210 feet; thence N 30° 30′ E 185 feet; thence S 89° 30′ E 520 feet; thence N 14° 20′ E 245 feet; thence N 61° 00′ W 180 feet; thence N 0° 40′ W 210 feet; thence N 79° 00′ W 390 feet; thence N 35° 40′ E 120 feet; thence N 46° 30′ W 800 feet; thence N 76° 30′ E 400 feet; thence S 61° 45′ E 210 feet; thence N 11° 50′ W 265 feet; thence S 78° 35′ W 290 feet; thence N 26° 30′ W 265 feet; thence N 73° 10′ W 400 feet; thence S 85° 00′ W 260 feet; thence N 29° 45′ W 130 feet; thence N 89° 30′ W 280 feet; thence N 39° 40′ W 150 feet; thence S 26° 00′ W 110 feet; thence S 34° 50′ E 550 feet; thence S 36° 00′ W 275 feet; thence N 39° 30′ W 400 feet; thence N 20° 35′ W 270 feet; thence N 68° 55′ W 150 feet; thence S 60° 00′ W 100 feet; thence S 44° 35′ E 105 feet; thence S 22° 30′ W 240 feet; thence N 55° 10′ W 225 feet; thence due W 260 feet; thence S 68° 15′ W 380 feet; thence due S 60 feet; thence S 58° 00′ E 110 feet; thence S 5° 30′ W 70 feet; thence N 85° 40′ W 370 feet; thence S 51° 00′ W 110 feet; thence S 22° 30′ E 230 feet; thence S 59° 10′ W 85 feet; thence N 60° 45′ W 220 feet; thence S 83° 00′ W 130 feet more or less to point on W line of said section; thence N 1225 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 4; thence W 75 feet along S line of said section; thence N 30° 40′ W 120 feet; thence N 44° 00′ E 190 feet more or less to point on E line of said section; thence S 240 feet more or less along E line of said section to place of beginning.

Section 5

The following lands in Sec. 5, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 5; thence E 5325 feet more or less along N line of said section to NE corner thereof; thence S 2480 feet along E line of said section; thence N 37° 15′ W 250 feet; thence S 87° 00′ W 165 feet; thence N 9° 30′ W 185 feet; thence S 47° 30′ W 245 feet; thence N 27° 15′ W

545 feet; thence S 65° 00′ W 380 feet; thence S 0° 30′ W 750 feet; thence S 44° 45′ E 265 feet; thence S 24° 00′ W 565 feet; thence S 28° 55′ W 685 feet; thence S 46° 30′ W 165 feet; thence N 33° 50′ W 220 feet; thence N 6° 00′ E 500 feet; thence N 83° 30′ E 240 feet; thence N 8° 45′ E 510 feet; thence N 82° 30′ W 100 feet; thence S 16° 00′ W 385 feet; thence S 85° 05′ W 145 feet; thence N 13° 30′ E 250 feet; thence N 41° 30′ W 270 feet more or less to point on S line of NE ¼ of said section; thence W 820 feet more or less along said S line to the center of said section; thence N 540 feet along W line of NE ¼ of said section; thence N 66° 45′ E 175 feet; thence S 84° 15′ E 225 feet; thence N 50° 00′ E 165 feet; thence N 1° 15′ W 210 feet; thence N 63° 30′ W 105 feet; thence N 27° 00′ W 185 feet; thence N 67° 00′ W 350 feet more or less to point on W line of NE ¼ of said section; thence N 465 feet along W line of NE ¼ of said section; thence N 53° 10′ W 180 feet; thence N 29° 15′ W 355 feet; thence N 75° 15′ W 885 feet; thence S 85° 30′ W 610 feet; thence S 64° 10′ W 535 feet; thence S 3° 20′ E 475 feet; thence S 56° 00′ W 145 feet; thence S 20° 30′ W 150 feet; thence N 11° 30′ W 165 feet; thence N 37° 50′ E 195 feet; thence N 28° 25′ W 200 feet; thence S 88° 30′ W 210 feet more or less to point on W line of said section; thence N 960 feet more or less along W line of said section to place of beginning.

Section 6

The following lands in Sec. 6, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 6; thence S 750 feet along E line of said section; thence S 61° 30′ W 190 feet; thence S 28° 30′ W 470 feet; thence S 49° 10′ W 225 feet; thence S 2° 50′ E 355 feet; thence S 88° 00′ W 100 feet; thence N 37° 55′ W 285 feet; thence S 48° 00′ W 410 feet; thence N 74° 00′ W 265 feet; thence S 58° 20′ W 735 feet; thence N 0° 30′ W 370 feet; thence N 47° 05′ E 570 feet; thence N 53° 25′ W 130 feet; thence N 36° 20′ E 400 feet; thence S 47° 20′ E 335 feet; thence N 67° 10′ E 250 feet; thence N 31° 10′ E 290 feet; thence S 84° 45′ W 435 feet; thence N 10° 20′ W 490 feet; thence N 59° 30′ W 770 feet more or less to point on N line of said section; thence E 2050 feet more or less along N line of said section to place of beginning.

Section 10

The following lands in Sec. 10, T 3 N, R 4 E, 1st P. M., to-wit:

All lands in the N ½ of Sec. 10, excepting the SW ¼ of NW ¼ of said section.

Section 11

The following lands in Sec. 11, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 11; thence E 1230 feet along N line of said section; thence due S 1610 feet; thence S 12° 45′ W 885 feet; thence southwesterly 1060 feet more or less to SW corner of NW ¼ of said section; thence N 2665 feet more or less along W line of said section to place of beginning.

- JACKSON TOWNSHIP

Such lands in T 4 N, R 4 E, 1st P. M., Jackson Township, are located in Sections 29, 30, 31, 32, 33, and 34 as follows:

Section 29

The following lands in Sec. 29, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 29, 1770 feet E of SW corner thereof; thence N 16° 00′ W 875 feet; thence N 68° 45′ E 105 feet; thence S 27° 20′ E 970 feet more or less to point on S line of said section; thence W 310 feet more or less along S line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 29, 2230 feet E of SW corner thereof; thence N 35° 00′ W 250 feet; thence N 55° 30′ E 65 feet; thence S 35° 20′ E 160 feet; thence S 82° 40′ E 255 feet; thence N 56° 30′ E 140 feet; thence N 87° 20′ E 265 feet; thence N 8° 00′ E 130 feet; thence N 58° 00′ E 60 feet; thence S 25° 00′ E 305 feet more or less to point on S line of said section; thence W 850 feet more or less along S line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 29, 1230 feet W of SE corner thereof; thence W 320 feet along S line of said section; thence N 21° 15′ E 180 feet; thence N 11° 30′ W 390 feet; thence S 87° 30′ E 135 feet; thence southerly 550 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 29, 1435 feet N of SW corner thereof; thence N 1425 feet along W line of said section; thence S 60° 15′ E 480 feet; thence S 23° 35′ E 140 feet; thence S 12° 30′ W 565 feet; thence S 39° 25′ W 140 feet; thence southwesterly 420 feet more or less to place of beginning.

Section 30

The following lands in Sec. 30, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 30, 2110 feet S of NE corner thereof; thence S 1425 feet along E line of said section; thence S 13° 00′ W 430 feet; thence S 47° 30′ E 75 feet; thence S 11° 15′ W 70 feet; thence N 78° 30′ W 145 feet; thence S 5° 45′ W 90 feet; thence S 27° 15′ E 170 feet; thence S 10° 00′ E 150 feet; thence S 20° 05′ W 570 feet more or less to point on S line of said section; thence W 1545 feet along S line of said section; thence N 9° 20′ E 420 feet; thence N 17° 10′ E 610 feet; thence N 45° 55′ E 590 feet; thence N 27° 30′ W 215 feet; thence N 11° 10′ W 455 feet; thence N 55° 30′ W 215 feet; thence N 1° 45′ W 335 feet more or less to point on S line of highway; thence easterly 500 feet along S line of highway; thence N 51° 30′ W 220 feet; thence N 5° 25′ W 460 feet; thence N 24° 15′ E 265 feet; thence N 46° 50′ W 235 feet; thence N 70° 30′ W 440 feet; thence N 52° 45′ W 280

feet; thence N 7° 40′ W 530 feet; thence N 17° 45′ E 390 feet; thence N 86° 25′ E 370 feet; thence S 7° 30′ W 150 feet; thence S 18° 50′ E 300 feet; thence S 41° 00′ E 650 feet; thence S 35° 10′ E 850 feet; thence S 70° 10′ E 400 feet; thence southeasterly 85 feet more or less to place of beginning.

Section 31

The following lands in Sec. 31, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 31, 1375 feet E of NW corner thereof; thence E 230 feet along said N line; thence S 39° 20′ E 350 feet; thence N 36° 22′ E 165 feet; thence S 49° 41′ E 100 feet; thence S 19° 37′ W 190 feet; thence S 21° 28′ E 435 feet; thence S 78° 43′ E 460 feet; thence S 89° 10 E 270 feet more or less to point on W line of NE ¼ of said section; thence S 6° 35′ E 115 feet; thence S 83° 16′ E 70 feet; thence S 22° 10′ E 225 feet; thence S 8° 25′ E 230 feet; thence S 6° 10′ W 280 feet; thence S 38° 00′ W 260 feet more or less to point on W line of NE ¼ of said section; thence S 40 feet along W line of NE ¼ of said section; thence S 77° 35′ E 135 feet; thence S 2° 45′ W 115 feet; thence S 56° 10′ W 145 feet more or less to point on W line of NE ¼ of said section; thence S 195 feet along said W line; thence N 71° 35′ E 150 feet; thence S 13° 15′ E 130 feet more or less to point on N line of SE ¼ of said section; thence S 42° 30′ E 145 feet; thence N 89° 05′ E 120 feet; thence N 29° 40′ E 125 feet; thence N 89° 20′ E 60 feet; thence S 9° 50′ E 140 feet; thence S 44° 20′ E 135 feet; thence N 68° 30′ E 185 feet; thence S 52° 10′ E 245 feet; thence N 27° 10′ E 155 feet; thence S 85° 20′ E 130 feet; thence S 1° 10′ W 230 feet; thence N 79° 20′ E 120 feet; thence S 15° 20′ E 140 feet; thence N 66° 00′ E 210 feet; thence S 47° 50′ E 60 feet; thence S 34° 10′ W 260 feet; thence S 26° 10′ E 140 feet; thence N 80° 50′ E 160 feet; thence S 26° 00′ W 90 feet; thence S 0° 20′ E 150 feet; thence S 33° 30′ E 140 feet; thence S 76° 10′ E 120 feet; thence S 26° 20′ W 155 feet; thence S 6° 10′ E 210 feet; thence S 69° 20′ E 115 feet; thence N 77° 00′ E 105 feet; thence S 67° 05′ E 910 feet more or less to point on E line of said section; thence S 455 feet more or less along said E line to SE corner of said section; thence W 2240 feet along S line of said section; thence N 75° 50′ W 430 feet; thence N 32° 45′ W 220 feet; thence N 70° 55′ E 315 feet; thence S 48° 00′ E 100 feet; thence S 0° 25′ E 85 feet; thence N 72° 00′ E 300 feet; thence N 50° 15′ W 735 feet; thence N 38° 10′ W 220 feet; thence N 63° 20′ W 370 feet; thence S 73° 45′ W 400 feet; thence N 9° 45′ E 150 feet; thence N 77° 45′ W 355 feet; thence S 60° 00′ W 305 feet; thence S 80° 05′ W 300 feet; thence S 2° 00′ W 495 feet; thence N 34° 10′ W 420 feet; thence N 88° 50′ W 220 feet; thence S 70° 05′ W 765 feet more or less to point on W line of said section; thence N 3610 feet along W line of said section; thence S 58° 50′ E 400 feet; thence S 26° 30′ E 300 feet; thence N 83° 15′ E 295 feet; thence N 53° 30′ E 375 feet; thence N 20° 35′ E 230 feet; thence N 58° 00′ W 220 feet; thence N 30° 00′ E 100 feet; thence S 61° 10′ E 305 feet; thence S 9° 05′ E 310 feet; thence S 57° 50′ E 160 feet; thence N 72° 00′ E 340 feet; thence N 2° 00′ W 180 feet; thence N 50° 10′ W 200 feet; thence N 18° 45′ W 345 feet; thence northwesterly 220 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 31, 400 feet W of NE corner thereof;

thence S 19° 30′ W 305 feet; thence N 88° 20′ E 515 feet more or less to point on E line of said section; thence S 2560 feet along said E line; thence S 52° 45′ W 150 feet; thence N 87° 55′ W 260 feet; thence N 82° 40′ W 410 feet; thence N 6° 50′ W 90 feet; thence N 58° 30′ W 380 feet; thence N 37° 30′ W 510 feet; thence N 68° 30′ W 290 feet; thence N 30° 30′ W 260 feet; thence N 89° 10′ W 75 feet; thence N 10° 45′ W 605 feet; thence N 2° 30′ W 725 feet; thence N 8° 45′ E 425 feet more or less to point on N line of said section; thence E 1545 feet more or less along N line of said section to place of beginning.

Section 32

The following lands in Sec. 32, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 32, 290 feet S of NW corner thereof; thence N 89° 50′ E 135 feet; thence S 22° 00′ E 490 feet; thence N 77° 45′ E 250 feet; thence N 17° 00′ W 275 feet; thence N 22° 00′ E 200 feet; thence S 82° 10′ E 50 feet; thence S 3° 30′ E 175 feet; thence S 33° 45′ E 205 feet; thence N 54° 10′ E 250 feet; thence N 71° 45′ E 600 feet; thence N 39° 15′ E 170 feet; thence S 61° 30′ E 295 feet; thence N 38° 15′ E 85 feet; thence N 26° 40′ W 355 feet more or less to point on N line of said section; thence E 310 feet along N line of said section; thence S 27° 00′ E 390 feet; thence S 10° 30′ E 195 feet; thence S 64° 30′ E 705 feet; thence N 30° 30′ E 45 feet; thence N 21° 00′ W 185 feet; thence N 23° 15′ E 280 feet; thence N 39° 20′ W 430 feet; thence S 82° 30′ W 210 feet; thence N 80° 10′ W 270 feet; thence N 35° 00′ W 40 feet more or less to point on N line of said section; thence E 850 feet along N line of said section; thence S 25° 00′ E 65 feet; thence S 68° 05′ E 300 feet; thence S 27° 05′ E 310 feet; thence N 37° 20′ E 380 feet; thence N 21° 10′ E 220 feet more or less to point on N line of said section; thence E 320 feet along N line of said section; thence S 21° 00′ E 315 feet; thence S 27° 30′ W 390 feet; thence S 1° 00′ E 170 feet; thence S 63° 15′ W 275 feet; thence S 47° 55′ W 475 feet; thence S 30° 50 E 110 feet; thence N 78° 45′ E 270 feet; thence S 30° 00′ E 925 feet; thence N 55° 50′ E 1110 feet; thence S 88° 10′ E 190 feet more or less to point on E line of said section; thence S 3780 feet more or less along E line of said section to SE corner thereof; thence W 2625 feet along S line of said section; thence N 1° 30′ E 250 feet; thence N 62° 30′ E 215 feet; thence N 14° 30′ E 140 feet; thence N 33° 35′ W 160 feet; thence S 77° 00′ W 155 feet; thence N 41° 35′ W 115 feet; thence S 43° 55′ W 200 feet; thence N 76° 50′ W 65 feet; thence N 1° 45′ E 250 feet; thence N 73° 50′ W 245 feet; thence S 88° 50′ W 180 feet; thence N 15° 00′ W 100 feet; thence S 88° 45′ W 240 feet; thence N 60° 20′ W 280 feet; thence N 37° 30′ E 70 feet; thence S 77° 45′ E 240 feet; thence N 65° 30′ E 160 feet; thence S 83° 30′ E 225 feet; thence S 68° 00′ E 270 feet; thence N 89° 10′ E 395 feet; thence S 36° 45′ E 105 feet; thence N 82° 45′ E 215 feet; thence N 47° 00′ W 335 feet; thence N 4° 40′ W 220 feet; thence N 8° 50′ E 230 feet; thence N 58° 05′ W 380 feet; thence N 33° 00′ E 335 feet; thence N 2° 35′ W 340 feet; thence N 55° 15′ W 180 feet; thence N 37° 00′ E 150 feet; thence N 22° 35′ W 140 feet; thence N 60° 35′ W 115 feet; thence S 63° 05′ W 555 feet; thence S 51° 45′ W 600 feet; thence S 84° 25′ W 235 feet; thence S 83° 30′ W 490 feet; thence N 67° 25′ W 240 feet; thence N 42° 15′ W 250 feet; thence S 88° 45′ W 130 feet; thence S 46° 15′ W 250 feet; thence S 36° 35′ W 200 feet more or less to point on W line of said section; thence

N 2560 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 32; thence N 455 feet along W line of said section; thence S 81° 05′ E 515 feet; thence S 0° 40′ E 50 feet; thence N 79° 00′ E 220 feet; thence N 38° 40′ W 150 feet; thence N 62° 00′ E 240 feet; thence S 43° 40′ E 160 feet; thence due S 155 feet; thence S 77° 10′ E 210 feet; thence N 47° 10′ E 185 feet; thence S 6° 30′ E 140 feet; thence S 85° 10′ E 390 feet; thence S 76° 45′ E 355 feet; thence S 74° 30′ E 520 feet more or less to point on S line of said section; thence W 2540 feet more or less along S line of said section to place of beginning.

Section 33

The following lands in Sec. 33, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 33, 90 feet E of NW corner thereof; thence E 235 feet along N line of said section; thence S 7° 30′ E 180 feet; thence S 39° 30′ E 215 feet; thence N 85° 30′ E 300 feet; thence S 3° 10′ W 470 feet; thence S 25° 45′ E 790 feet; thence S 10° 10′ E 360 feet; thence S 24° 00′ W 480 feet; thence S 79° 00′ W 355 feet; thence N 55° 00′ W 585 feet; thence S 53° 40′ W 165 feet more or less to point on W line of said section; thence N 565 feet along W line of said section; thence S 88° 45′ E 75 feet; thence S 63° 15′ E 700 feet; thence N 38° 00′ E 110 feet; thence N 70° 40′ W 175 feet; thence N 4° 35′ E 230 feet; thence N 34° 45′ W 360 feet; thence N 9° 30′ W 590 feet; thence N 27° 30′ W 460 feet; thence northerly 200 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 33; thence N 2850 feet along W line of said section; thence N 89° 00′ E 880 feet; thence N 73° 15′ E 330 feet; thence N 83° 15′ E 360 feet; thence S 71° 15′ E 285 feet; thence N 62° 50′ E 320 feet; thence N 27° 30′ E 210 feet; thence N 78° 45′ E 430 feet; thence S 56° 30′ E 500 feet more or less to point on W line of highway; thence southeasterly 210 feet along said W line of highway; thence S 18° 00′ E 185 feet; thence S 86° 10′ E 165 feet; thence S 5° 00′ E 125 feet; thence S 65° 20′ E 665 feet; thence N 44° 40′ E 135 feet; thence S 65° 45′ E 600 feet; thence S 40° 15′ E 705 feet; thence S 4° 30′ E 580 feet; thence N 89° 45′ E 165 feet more or less to point on E line of said section; thence S 965 feet more or less along E line of said section to SE corner thereof; thence W 5290 feet more or less along S line of said section to place of beginning.

Section 34

The following lands in Sec. 34, T 4 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 34; thence N 805 feet along W line of said section; thence S 89° 50′ E 120 feet; thence S 35° 05′ E 50 feet; thence N 76° 00′ E 160 feet; thence S 89° 50′ E 380 feet; thence S 52° 55′ E 515 feet; thence N 80° 30′ E 245 feet more or less to point on E line of W ½ of SW ¼ of said section; thence S 235 feet along said E line; thence S 52° 45′ W 145 feet; thence S 15° 30′ W 215 feet more or less to point on S line of said

section; thence W 75 feet along S line of said section; thence N 38° 20′ W 430 feet; thence S 89° 30′ W 130 feet; thence S 23° 30′ W 370 feet more or less to point on S line of said section; thence W 520 feet more or less along S line of said section to place of beginning.

PREBLE COUNTY

Such lands as lie in Preble County are located in Gratis and Lanier Townships as follows:

GRATIS TOWNSHIP

Such lands in T 4 N, R 3 E, 1st P. M., Gratis Township, are located in Sections 1, 2, 3, and 12 as follows:

Section 1

The following lands in Sec. 1, T 4 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 1; thence E 4250 feet along N line of said section; thence S 51° 45′ W 610 feet; thence S 38° 30′ W 200 feet; thence S 46° 00′ W 750 feet; thence S 57° 05′ W 305 feet; thence S 36° 15′ W 200 feet more or less to point on W line of NE ¼ of said section; thence S 1140 feet along said W line; thence S 66° 05′ W 140 feet; thence N 14° 55′ W 245 feet; thence due W 220 feet; thence S 0° 30′ E 330 feet; thence S 42° 30′ E 300 feet more or less to point on S line of NW ¼ of said section; thence W 395 feet along said S line; thence S 33° 10′ W 300 feet; thence S 75° 45′ W 685 feet; thence S 45° 00′ W 425 feet; thence S 60° 35′ E 540 feet; thence S 68° 30′ W 170 feet; thence S 21° 30′ E 270 feet; thence N 89° 00′ W 110 feet; thence N 37° 25′ W 370 feet; thence N 80° 45′ W 310 feet; thence S 80° 55′ W 170 feet; thence S 50° 45′ W 215 feet; thence S 21° 50′ W 280 feet; thence S 21° 15′ E 320 feet; thence due S 665 feet; thence S 58° 40′ E 310 feet; thence S 5° 30′ E 360 feet more or less to point on S line of said section; thence W 350 feet along S line of said section; thence N 54° 45′ W 150 feet; thence N 12° 45′ W 465 feet; thence N 27° 40′ W 380 feet more or less to point on W line of said section; thence N 4865 feet more or less along W line of said section to place of beginning.

Section 2

The following lands in Sec. 2, T 4 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 2; thence E 5360 feet more or less along N line of said section to NE corner thereof; thence S 4865 feet along E line of said section; thence N 27° 35′ W 535 feet; thence N 3° 00′ W 190 feet; thence N 30° 00′ E 145 feet; thence N 7° 35′ W 475 feet; thence S 56° 00′ W 665 feet; thence S 44° 40′ W 580 feet; thence S 60° 00′ W 270 feet; thence S 84° 50′ W 450 feet; thence S 62° 40′ W 160 feet; thence S 31° 45′ W 150 feet; thence N 60° 00′ W 110 feet; thence N 5° 00′ E 280 feet; thence N 38° 00′ E 290 feet; thence N 84° 50′ E 305 feet; thence S 63° 50′ E 200 feet; thence N 53° 20′ E 210 feet; thence N 9° 00′ E 405 feet; thence N 47° 00′ E 275 feet; thence N 67° 35′ E 480 feet; thence N 7° 40′ E 325 feet; thence N 14° 00′ W 250 feet; thence N 26° 00′ W 270 feet; thence N 59° 50′ W 280 feet; thence N 54° 40′ W 460 feet; thence N 48° 15′ W 500 feet; thence N 56° 00′ W 335

feet; thence S 89° 10′ W 165 feet; thence S 55° 25′ W 360 feet; thence S 37° 10′ W 145 feet; thence S 10° 05′ W 665 feet; thence S 15° 00′ W 640 feet; thence N 74° 00′ W 75 feet; thence N 3° 25′ E 345 feet; thence N 10° 30′ E 430 feet; thence N 17° 05′ W 105 feet; thence S 89° 30′ W 310 feet; thence N 48° 30′ E 105 feet; thence N 59° 35′ E 210 feet; thence N 5° 00′ E 320 feet; thence N 13° 00′ W 300 feet; thence N 61° 00′ W 280 feet; thence N 80° 50 E 780 feet; thence N 15° 30′ E 70 feet; thence N 34° 30′ W 430 feet; thence S 75° 10′ W 145 feet; thence N 28° 40′ W 290 feet; thence N 75° 00′ W 480 feet; thence S 88° 00′ W 305 feet; thence N 73° 45′ W 265 feet; thence S 82° 30′ W 260 feet; thence N 80° 15′ W 510 feet; thence N 58° 55′ W 480 feet; thence S 85° 00′ W 250 feet more or less to point on W line of said section; thence N 200 feet more or less along W line of said section to place of beginning.

Section 3

The following lands in Sec. 3, T 4 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 3, 300 feet E of NW corner thereof; thence E 1930 feet along N line of said section; thence S 46° 50′ W 225 feet; thence S 60° 00′ W 650 feet; thence N 81° 50′ W 95 feet; thence N 50° 00′ W 140 feet; thence S 53° 50′ W 210 feet; thence S 70° 40′ W 245 feet; thence N 88° 45′ W 230 feet; thence S 69° 45′ W 275 feet; thence S 78° 25′ W 405 feet more or less to point on W line of said section; thence N 250 feet along W line of said section; thence N 52° 15′ E 260 feet; thence N 21° 35′ E 185 feet; thence northerly 160 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 3; thence S 200 feet along E line of said section; thence S 72° 30′ W 305 feet; thence S 43° 15′ E 115 feet; thence S 68° 45′ E 215 feet more or less to point on E line of said section; thence S 125 feet along said E line; thence N 71° 35′ W 210 feet; thence S 1° 10′ E 530 feet; thence N 79° 30′ W 110 feet; thence N 6° 45′ W 240 feet; thence N 23° 00′ W 220 feet; thence N 53° 35′ W 200 feet; thence S 56° 15′ W 360 feet; thence S 48° 00′ W 345 feet; thence S 78° 30′ W 160 feet; thence N 64° 10′ W 330 feet; thence N 16° 30′ E 55 feet; thence N 85° 00′ E 70 feet; thence S 80° 00′ E 230 feet; thence N 26° 10′ E 550 feet; thence N 55° 40′ E 280 feet; thence due N 95 feet more or less to point on N line of said section; thence E 800 feet more or less along N line of said section to place of beginning.

Section 12

The following lands in Sec. 12, T 4 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 12, 410 feet E of NW corner thereof; thence E 525 feet along N line of said section; thence S 7° 45′ W 695 feet; thence S 45° 00′ W 260 feet; thence S 62° 45′ W 90 feet; thence S 8° 00′ W 220 feet; thence S 34° 30′ W 370 feet; thence N 5° 00′ W 130 feet; thence N 15° 30′ E 595 feet; thence N 51° 30′ E 140 feet; thence N 37° 05′ W 290 feet; thence northerly 410 feet more or less to place of beginning.

LANIER TOWNSHIP

Such lands in T 5 N, R 3 E, 1st P. M., Lanier Township, are located in Sections 26, 27, 34, 35, and 36 as follows:

Section 26

The following lands in Sec. 26, T 5 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 26; thence N 2795 feet more or less along W line of said section to point on S line of highway; thence southeasterly 305 feet along said S line of highway; thence S 18° 30′ E 290 feet; thence S 14° 30′ W 305 feet; thence S 39° 30′ E 110 feet; thence S 58° 15′ W 90 feet; thence S 10° 30′ W 405 feet; thence S 46° 35′ E 400 feet; thence S 67° 30′ E 335 feet; thence S 38° 30′ E 400 feet; thence S 23° 00′ E 440 feet; thence S 48° 45′ E 380 feet; thence S 58° 30′ E 320 feet more or less to point on S line of said section; thence W 1810 feet more or less along S line of said section to place of beginning.

Section 27

The following lands in Sec. 27, T 5 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 27; thence W 960 feet along S line of said section; thence N 26° 45′ W 1750 feet; thence N 21° 00′ W 2545 feet more or less to point on W line of NE ¼ of said section; thence N 880 feet along said W line of NE ¼; thence S 70° 45′ E 440 feet; thence S 39° 00′E 910 feet; thence S 56° 30′ E 325 feet; thence S 31° 10′ E 280 feet; thence S 54° 30′ E 175 feet; thence N 83° 35′ E 70 feet more or less to point on W line of highway; thence southeasterly 1285 feet more or less along said W line of highway to point on E line of said section; thence S 2795 feet more or less along E line of said section to place of beginning.

Section 34

The following lands in Sec. 34, T 5 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 34; thence S 3850 feet along E line of said section; thence N 13° 10′ W 435 feet; thence N 26° 50′ W 315 feet; thence N 52° 15′ W 370 feet; thence N 37° 25′ W 250 feet; thence N 8° 45′ W 470 feet; thence N 26° 35′ W 320 feet; thence N 52° 50′ E 225 feet; thence N 1° 10′ E 265 feet; thence N 12° 45′ W 540 feet; thence N 3° 55′ W 1065 feet more or less to point on N line of said section; thence E 920 feet more or less along N line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 34; thence W 660 feet along S line of said section; thence N 49° 30′ W 205 feet; thence N 10° 30′ W 190 feet; thence N 60° 00′ W 195 feet; thence N 79° 45′ W 260 feet; thence N 4° 00′ W 290 feet; thence N 67° 45′ W 350 feet; thence S 61° 15′ W 545 feet; thence S 82° 15′ W 250 feet; thence S 39° 10′ W 350 feet; thence S 21° 30′ W 230 feet; thence S 61° 00′ W 160 feet; thence N 83° 15′ W 175 feet; thence S 47° 40′ W 100 feet more or less to point on S line of said section; thence W 1930 feet along S line of said section; thence N 50° 30′ E 215 feet; thence S 82° 30′ E 520 feet; thence N 41° 05′ E 465 feet; thence N 57° 10′ E 240 feet; thence

N 74° 00′ E 170 feet; thence N 5° 15′ W 170 feet; thence N 61° 00′ E 195 feet; thence N 29° 30′ W 145 feet; thence due W 175 feet; thence S 67° 20′ W 175 feet; thence due W 390 feet; thence N 26° 10′ W 145 feet; thence N 87° 00′ E 235 feet; thence N 14° 15′ W 205 feet; thence S 81° 45′ E 530 feet; thence N 83° 30′ E 480 feet; thence S 25° 00′ E 180 feet; thence N 63° 25′ E 975 feet; thence N 46° 25′ E 285 feet; thence N 12° 55′ E 320 feet; thence N 34° 45′ E 120 feet; thence S 58° 15′ E 145 feet; thence S 73° 00′ E 755 feet; thence S 38° 50′ E 355 feet; thence S 52° 05′ E 260 feet; thence S 83° 00′ E 430 feet; thence N 82° 35′ E 200 feet more or less to point on E line of said section; thence S 1355 feet more or less along E line of said section to place of beginning.

Section 35

The following lands in Sec. 35, T 5 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 35: thence E 1805 feet along N line of said section; thence S 58° 00′ E 1000 feet; thence S 45° 45′ E 485 feet; thence S 28° 10′ E 520 feet; thence S 39° 00′ E 405 feet; thence S 29° 45′ E 1030 feet; thence S 72° 15′ E 100 feet; thence N 28° 30′ E 80 feet; thence N 22° 30′ W 260 feet; thence N 3° 30′ E 330 feet; thence S 64° 00′ E 55 feet; thence S 5° 45′ E 355 feet; thence S 30° 20′ E 290 feet; thence S 45° 15′ W 250 feet; thence N 80° 30′ E 180 feet; thence S 28° 00′ E 235 feet; thence S 10° 30′ W 1005 feet; thence S 36° 00′ W 650 feet; thence S 2° 50′ E 390 feet; thence S 41° 40′ E 320 feet; thence N 87° 45′ E 130 feet; thence N 40° 25′ E 230 feet; thence S 81° 50′ E 320 feet; thence N 79° 30′ E 525 feet; thence S 51° 20′ E 245 feet more or less to point on E line of said section; thence S 305 feet more or less along E line of said section to SE corner thereof; thence W 5360 feet more or less along S line of said section to SW corner thereof; thence N 5300 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 35, 1325 feet N of SE corner thereof; thence N 87° 40′ W 230 feet; thence N 16° 20′ W 400 feet; thence N 30° 20′ E 235 feet; thence N 55° 25′ E 260 feet more or less to point on E line of said section; thence S 740 feet more or less along E line of said section to place of beginning.

Section 36

The following lands in Sec. 36, T 5 N, R 3 E. 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 36, 1365 feet S of NE corner thereof; thence S 3250 feet along E line of said section; thence S 71° 00′ W 80 feet; thence S 51° 05′ W 660 feet; thence S 31° 30′ W 280 feet more or less to point on S line of said section; thence W 4600 feet more or less along S line of said section to SW corner thereof; thence N 305 feet along W line of said section; thence S 49° 30′ E 80 feet; thence N 15° 35′ E 145 feet; thence N 88° 00′ E 770 feet; thence N 13° 00′ E 135 feet; thence N 21° 45′ W 145 feet; thence N 65° 30′ W 270 feet, thence N 0° 45′ W 60 feet; thence N 49° 00′ W 170 feet; thence due W 165 feet; thence N 1° 00′ W 170 feet; thence due W 315 feet more or less to point on W line of said section; thence N 940 feet along W line of said section; thence N 55° 35′ E 135 feet; thence N 26° 35′

E 600 feet more or less to point on N line of SW ¼ of said section; thence E 160 feet along N line of SW ¼ of said section; thence S 12° 30′ W 135 feet; thence S 25° 40′ W 195 feet; thence S 12° 55′ W 550 feet; thence S 12° 35′ E 250 feet; thence S 56° 40′ E 230 feet; thence N 52° 30′ E 265 feet; thence N 30° 00′ E 175 feet; thence S 43° 00′ E 230 feet; thence S 67° 00′ W 245 feet; thence S 2° 45′ W 100 feet; thence S 44° 55′ E 705 feet; thence S 69° 00′ E 200 feet; thence N 82° 15′ E 305 feet; thence N 88° 30′ E 325 feet; thence N 66° 00′ E 195 feet; thence N 8° 40′ E 405 feet; thence N 33° 40′ E 390 feet; thence N 22° 35′ E 735 feet; thence N 29° 30′ E 395 feet; thence N 54° 15′ E 155 feet, thence S 43° 30′ E 125 feet; thence N 86° 10′ E 235 feet; thence N 35° 40′ E 360 feet; thence N 43° 55′ E 220 feet; thence N 19° 30′ W 555 feet; thence N 63° 15′ E 55 feet; thence S 28° 00′ E 290 feet; thence S 75° 10′ E 370 feet; thence N 83° 20′ E 620 feet; thence N 57° 00′ E 420 feet; thence due N 80 feet; thence S 76° 00′ W 400 feet; thence N 15° 00′ W 110 feet; thence N 75° 00′ E 195 feet; thence N 56° 35′ E 260 feet; thence easterly 145 feet more or less to place of beginning.

ENGLEWOOD RETARDING BASIN

Lands now within the limits of The Miami Conservancy District which may be damaged or which it may be necessary for the District to take for the purposes of the District by reason of the construction of the Englewood Retarding Basin are located in Montgomery and Miami Counties as follows: (Refer to Sheets Nos. 6, 7, 8, 9, 10, 11, 12, and 13 of Exhibit No. 5, which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located in Butler and Randolph Townships and within the corporate limits of the Municipal Corporation of Englewood as follows:

BUTLER TOWNSHIP

(See also "Butler and Randolph Townships" for Sections 3, 10, 11, 14, 15, 22, and 23, which lie partly in each township.)

Such lands in T 5 N, R 5 E, 1st P. M., Butler Township, are located in Section 2 as follows:

Section 2

The following lands in Sec. 2, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 2; thence E 3480 feet along N line of said section; thence S 30° 15′ W 455 feet; thence S 16° 10′ W 455 feet; thence S 1° 25′ E 885 feet; thence S 89° 00′ E 85 feet; thence S 8° 35′ W 150 feet; thence N 89° 15′ W 530 feet; thence S 0° 55′ E 2415 feet; thence S 30° 00′ W 375 feet; thence S 22° 10′ W 225 feet; thence S 6° 10′ W 300 feet; thence S 19° 10′ E 140 feet; thence S 4° 15′ W 170 feet; thence S 35° 55′ W 180 feet; thence S 13° 20′ E 120 feet more or less to point on S line of said section; thence W 2260 feet more or less along S line of said section to SW corner thereof; thence N 5670 feet more or less along W line of said section to place of beginning.

BUTLER AND RANDOLPH TOWNSHIPS

(See also Butler Township and Randolph Township.)

Such lands in T 5 N, R 5 E, 1st P. M., Butler and Randolph Townships, are located in Sections 3, 10, 11, 14, 15, 22, and 23 as follows:

Section 3

The following lands in Sec. 3, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 3; thence E 5320 feet more or less along N line of said section to NE corner thereof; thence S 5670 feet more or less along E line of said section to SE corner thereof; thence W 3225 feet along S line of said section; thence N 54° 30′ W 250 feet; thence N 3° 00′ E 50 feet; thence N 76° 45′ E 200 feet; thence N 41° 00′ E 90 feet; thence N 24° 30′ W 140 feet; thence N 4° 45′ E 285 feet; thence N 31° 30′ W 200 feet; thence N 20° 00′ E 335 feet; thence N 1° 50′ W 545 feet; thence N 54° 30′ W 200 feet; thence N 45° 30′ E 325 feet; thence N 2° 10′ W 130 feet; thence N 39° 30′ W 205 feet; thence N 16° 00′ E 160 feet; thence N 50° 45′ W 195 feet; thence N 79° 15′ W 165 feet; thence N 6° 00′ W 50 feet; thence N 59° 15′ E 280 feet; thence N 1° 30′ W 210 feet; thence N 26° 15′ W 710 feet; thence N 34° 15′ W 720 feet; thence N 75° 00′ W 340 feet; thence N 51° 05′ E 120 feet; thence N 22° 00′ W 275 feet; thence N 35° 20′ W 285 feet; thence N 52° 10′ W 300 feet; thence N 87° 15′ W 190 feet; thence N 49° 45′ W 140 feet; thence N 23° 05′ W 290 feet; thence N 74° 00′ W 225 feet more or less to point on W line of said section; thence N 35 feet more or less along W line of said section to place of beginning.

Section 10

The following lands in Sec. 10, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 10; thence S 5300 feet more or less along E line of said section to SE corner thereof; thence W 3125 feet along S line of said section; thence N 7° 15′ W 530 feet; thence N 21° 00′ W 340 feet; thence N 2° 35′ E 415 feet; thence N 36° 15′ E 290 feet; thence N 0° 45′ E 230 feet; thence N 4° 45′ E 600 feet more or less to point on N line of highway; thence N 27° 30′ W 250 feet more or less to point on E line of the Municipal Corporation of Union; thence northerly 450 feet more or less along said E corporation line to NE corner of said Corporation; thence N 2° 20′ W 200 feet; thence N 42° 45′ W 170 feet; thence N 31° 30′ E 200 feet; thence N 20° 00′ W 150 feet; thence N 65° 00′ W 65 feet; thence N 6° 30′ E 70 feet; thence N 58° 30′ E 95 feet; thence N 21° 30′ E 360 feet; thence N 4° 00′ E 150 feet; thence N 23° 00′ W 215 feet; thence N 11° 00′ E 205 feet; thence N 14° 15′ W 240 feet; thence 9° 40′ E 310 feet; thence N 35° 15′ W 115 feet more or less to point on N line of said section; thence E 3225 feet more or less along N line of said section to place of beginning.

Section 11

The following lands in Sec. 11. T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 11; thence E 2260 feet along N line of said section; thence S 13° 00′ E 375 feet; thence S 8° 00′ W 1365 feet; thence S 48° 30′ W 220 feet; thence S 75° 00′ E 95 feet; thence S 5° 30′ W 975 feet;

thence S 11° 40′ E 160 feet; thence S 24° 10′ W 170 feet; thence S 7° 35′ E 315 feet; thence S 11° 10′ W 640 feet; thence S 64° 45′ E 125 feet; thence S 10° 30′ W 1050 feet; thence S 28° 30′ W 145 feet more or less to point on S line of said section; thence W 1725 feet more or less along S line of said section to SW corner thereof; thence N 5300 feet more or less along W line of said section to place of beginning.

Section 14

The following lands in Sec. 14, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 14; thence E 1725 feet along N line of said section; thence S 27° 40′ W 145 feet; thence S 2° 40′ E 400 feet; thence S 28° 00′ W 175 feet; thence S 10° 10′ W 380 feet; thence S 4° 10′ E 1060 feet; thence S 13° 40′ E 335 feet; thence S 34° 30′ E 260 feet; thence S 57° 15′ E 165 feet; thence N 69° 30′ E 325 feet; thence easterly 385 feet more or less to center of said section; then S 59° 00′ E 325 feet more or less to point on S line of highway; thence easterly 2375 feet more or less along S line of highway to point on E line of said section; thence S 2670 feet more or less along E line of said section to SE corner thereof; thence W 5295 feet more or less along S line of said section to SW corner thereof; thence N 5275 feet more or less along W line of said section to place of beginning.

Section 15

The following lands in Sec. 15, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 15; thence S 5275 feet more or less along E line of said section to SE corner thereof; thence W 2075 feet more or less along S line of said section to point on E line of the Municipal Corporation of Englewood; thence northerly 2900 feet more or less along E line of said Corporation to NE corner thereof; thence westerly 160 feet more or less along N line of said Corporation to point on E line of highway; thence northerly 500 feet along E line of highway; thence due W 100 feet; thence N 17° 00′ W 1405 feet; thence N 5° 30′ W 205 feet; thence N 1° 10′ E 590 feet more or less to point on N line of said section; thence E 3125 feet more or less along N line of said section to place of beginning.

Section 22

The following lands in Sec. 22, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 22; thence S 3135 feet more or less along E line of said section to point on N line of highway; thence northwesterly 1240 feet along N line of said highway; thence N 46° 40′ E 560 feet; thence N 39° 35′ W 890 feet; thence N 86° 00′ W 455 feet; thence N 29° 00′ E 475 feet; thence N 31° 05′ W 435 feet; thence N 51° 30′ W 300 feet; thence N 36° 30′ W 315 feet; thence S 85° 15′ W 140 feet; thence S 5° 00′ E 360 feet; thence N 41° 30′ W 310 feet; thence N 88° 30′ W 65 feet more or less to point on E line of the Municipal Corporation of Englewood; thence northwesterly 510 feet more or less along E line of said Corporation to point on N line of said section; thence E 2325 feet more or less along N line of said section to place of beginning.

Section 23

The following lands in Sec. 23, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 23; thence E 5290 feet more or less along N line of said section to NE corner thereof; thence S 1590 feet along E line of said section; thence S 38° 00′ W 1695 feet; thence S 46° 30′ W 2220 feet more or less to point on W line of SE ¼ of said section; thence N 89° 35′ W 2640 feet more or less to point on W line of said section; thence N 4500 feet more or less along W line of said section to place of beginning.

RANDOLPH TOWNSHIP

(See also "Butler and Randolph Townships" for Sections 3, 10, 11, 14, 15, 22, and 23 which lie partly in each township.)

Such lands in T 5 N, R 5 E, 1st P. M., Randolph Township, are located in Section 4 as follows:

Section 4

The following lands in Sec. 4, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 4, 395 feet W of NE corner thereof; thence S 59° 10′ W 95 feet; thence S 80° 10′ W 485 feet; thence S 34° 00′ W 225 feet; thence N 73° 00′ W 85 feet; thence S 59° 10′ W 650 feet; thence S 80° 25′ W 420 feet; thence N 32° 35′ E 340 feet; thence N 5° 30′ E 135 feet; thence N 33° 20′ E 285 feet more or less to point on N line of said section; thence E 1385 feet more or less along N line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 4; thence S 35 feet along E line of said section; thence N 74° 00′ W 115 feet more or less to point on N line of said section; thence E 105 feet more or less along N line of said section to place of beginning.

MUNICIPAL CORPORATION OF ENGLEWOOD

The following lands within the corporate limits of the Municipal Corporation of Englewood included within the lines described as follows, to-wit:

Beginning at the corner of the Municipal Corporation of Englewood formed by the E line of said Corporation in Sec. 15, T 5 N, R 5 E, 1st P. M., and the S line of said section, said corner being also 2120 feet more or less W of SE corner of said section; thence W 190 feet more or less along S line of said Corporation to point on E line of highway; thence northwesterly 390 feet along said E line of highway; thence N 70° 30′ E 325 feet more or less to point on E line of said Corporation; thence southerly 470 feet more or less along said E corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at a point on the N line of National Road 100 feet E of SE corner of Lot 23 of the Municipal Corporation of Englewood; thence N 10° 30′ W 240 feet; thence N 78° 45′ E 120 feet more or less to point on E line of said corporation; thence southerly 220 feet more or less

along said E corporation line to point on N line of National Road; thence westerly 125 feet more or less along said N line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at NE corner of Municipal Corporation of Englewood; thence southerly 360 feet along E line of said corporation; thence N 29° 00′ W 340 feet more or less to point on E line of highway; thence northerly 70 feet more or less along E line of highway to point on N line of said Corporation; thence easterly 160 feet more or less along said N line to place of beginning.

MIAMI COUNTY

Such lands as lie in Miami County are located in Union, Monroe, Newton and Newberry Townships and within the corporate limits of the Municipal Corporation of West Milton as follows:

UNION TOWNSHIP

Such lands in T 6 N, R 5 E, 1st P. M., Union Township, are located in Sections 3, 4, 5, 9, 10, 14, 16, 21, 23, 26, 27, 28, 33, 34, and 35 as follows:

Section 3

The following lands in Sec. 3, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 3; thence N 2620 feet more or less along W line of said section to W ¼ corner; thence E 155 feet along N line of SW ¼ of said section; thence S 2° 45′ W 110 feet; thence S 85° 15′ E 240 feet; thence S 40° 20′ W 300 feet; thence N 87° 25′ E 240 feet; thence N 69° 30′ E 355 feet; thence S 0° 35′ W 275 feet; thence S 64° 30′ W 240 feet; thence S 34° 30′ W 115 feet; thence S 58° 15′ E 335 feet; thence S 43° 05′ W 220 feet; thence S 0° 20′ E 240 feet; thence S 25° 30′ E 340 feet; thence S 0° 35′ W 265 feet; thence S 89° 30′ E 135 feet; thence S 0° 45′ W 145 feet more or less to point on N line of highway; thence N 84° 15′ E 370 feet; thence N 68° 45′ E 695 feet; thence N 88° 55′ E 305 feet; thence S 8° 40′ E 60 feet; thence S 63° 05′ W 670 feet; thence S 44° 40′ W 390 feet; thence S 8° 50′ E 90 feet; thence S 39° 15′ E 250 feet more or less to point on S line of said section; thence W 1500 feet more or less along said S line to place of beginning.

Section 4

The following lands in Sec. 4, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 4; thence E 4280 feet along N line of said section; thence S 34° 00′ W 180 feet; thence S 17° 00′ W 290 feet; thence S 35° 25′ W 360 feet; thence S 83° 30′ E 140 feet; thence S 61° 55′ W 230 feet; thence S 33° 00′ W 250 feet; thence S 10° 35′ E 480 feet; thence S 39° 05′ E 545 feet; thence S 32° 10′ E 360 feet; thence N 88° 50′ E 160 feet; thence N 50° 30′ E 520 feet; thence N 14° 15′ E 300 feet; thence S 88° 20′ E 120 feet; thence N 63° 55′ E 240 feet more or less to point on E line of said section; thence S 230 feet along E line of said section; thence S 53° 00′ W 150 feet; thence S 17° 45′ W 180 feet; thence S 67° 30′ W 190 feet; thence S 40° 00′ W 380 feet; thence S 5° 10′ E 110 feet; thence S 55° 30′ E 260 feet;

thence N 34° 10′ E 150 feet; thence N 83° 25′ E 150 feet; thence S 9° 30′ W 215 feet more or less to a point on S line of NE ¼ of said section; thence E 160 feet more or less along S line of said NE ¼ to SE corner thereof; thence S 2620 feet more or less along E line of said section to SE corner thereof; thence due W 1660 feet along S line of said section; thence N 15° 00′ W 135 feet; thence N 78° 00′ W 195 feet; thence N 55° 55′ W 500 feet; thence N 67° 45′ W 225 feet; thence N 52° 30′ W 665 feet; thence S 52° 00′ W 145 feet; thence N 76° 10′ W 530 feet; thence N 1° 00′ E 125 feet; thence N 76° 50′ W 620 feet; thence S 86° 30′ W 520 feet; thence S 27° 40′ W 360 feet; thence N 4° 20′ W 600 feet; thence N 88° 00′ E 1060 feet; thence N 40° 00′ E 390 feet; thence due E 250 feet more or less to point on W right-of-way line of C. C. C. & St. L. Ry. Co.; thence northwesterly 880 feet more or less along said W right-of-way line to a point on N line of SW ¼ of said section; thence E 130 feet along N line of SW ¼ of said section; thence N 42° 20′ W 305 feet; thence N 10° 35′ E 355 feet; thence N 37° 10′ W 530 feet; thence N 51° 35′ E 140 feet; thence N 31° 35′ W 175 feet; thence S 71° 15′ W 230 feet; thence S 88° 15′ W 310 feet; thence S 35° 00′ W 250 feet; thence S 6° 05′ W 450 feet; thence S 76° 40′ W 75 feet; thence N 48° 50′ W 120 feet; thence S 89° 20′ W 175 feet more or less to a point on W line of said section; thence N 2120 feet more or less along W line of said section to place of beginning.

Section 5

The following lands in Sec. 5, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 5; thence S 2120 feet along E line of said section; thence S 56° 30′ W 160 feet; thence N 82° 05′ W 260 feet; thence S 60° 35′ W 340 feet; thence S 32° 00′ W 210 feet; thence southerly 185 feet more or less to NE corner of the Municipal Corporation of Ludlow Falls; thence westerly 480 feet along N line of said Corporation; thence N 26° 40′ W 310 feet; thence N 13° 30′ E 930 feet; thence N 45° 00′ E 450 feet; thence N 12° 30′ E 500 feet; thence N 26° 00′ E 230 feet; thence N 61° 00′ E 180 feet; thence N 40° 35′ W 190 feet; thence N 2° 00′ E 265 feet more or less to point on N line of said section; thence E 615 feet more or less along N line of said section to place of beginning.

Section 9

The following lands in Sec. 9, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 9; thence S 4130 feet along E line of said section; thence S 69° 20′ W 175 feet; thence S 13° 15′ W 610 feet; thence S 44° 00′ W 250 feet; thence S 36° 10′ E 270 feet; thence N 85° 50′ W 170 feet; thence S 16° 20′ E 140 feet more or less to point on S line of said section; thence W 690 feet along said S line; thence N 4° 25′ W 200 feet; thence N 89° 15′ W 370 feet; thence N 64° 15′ W 150 feet; thence N 78° 25′ W 430 feet; thence S 67° 50′ W 440 feet; thence S 6° 35′ W 230 feet more or less to point on S line of said section; thence W 1160 feet along said S line; thence N 7° 00′ W 290 feet; thence N 65° 30′ W 390 feet; thence N 40° 45′ W 140 feet; thence S 89° 10′ W 250 feet; thence S 62° 00′ W 290 feet; thence N 70° 20′ W 210 feet; thence N 78° 20′ E 175 feet; thence N 30° 50′ E 260 feet; thence N 67° 00′ E 360 feet; thence S 76° 40′ E 540 feet;

thence N 71° 00′ E 170 feet; thence N 15° 30′ E 230 feet; thence N 40° 00′ E 240 feet; thence S 59° 00′ E 125 feet; thence N 30° 00′ E 495 feet; thence N 75° 20′ E 890 feet; thence N 58° 30′ E 480 feet; thence N 39° 25′ E 225 feet; thence N 8° 00′ E 485 feet more or less to point on N line of SE ¼ of said section; thence N 32° 25′ W 160 feet; thence N 22° 15′ E 230 feet; thence N 55° 40′ W 425 feet; thence N 1° 30′ E 70 feet; thence N 68° 40′ E 110 feet; thence N 9° 00′ E 330 feet; thence N 38° 20′ W 140 feet; thence N 3° 15′ E 420 feet; thence N 41° 30′ W 130 feet; thence N 64° 35′ W 435 feet; thence N 74° 35′ E 530 feet; thence N 16° 15′ E 330 feet; thence N 15° 15′ W 350 feet more or less to point on N line of said section; thence E 1660 feet more or less along N line of said section to place of beginning.

Section 10

The following lands in Sec. 10, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 10; thence E 1500 feet along N line of said section; thence S 39° 10′ E 345 feet; thence S 28° 10′ E 500 feet; thence N 67° 25′ E 615 feet; thence S 20° 45′ E 75 feet; thence S 56° 00′ W 325 feet; thence S 14° 20′ E 145 feet; thence S 39° 35′ W 590 feet; thence S 89° 30′ W 135 feet more or less to a point on W right-of-way line of the C. C. C. & St. L. Ry. Co.; thence southeasterly 1435 feet more or less along said right-of-way line to point on S line of NW ¼ of said section; thence S 8° 40′ E 640 feet; thence S 9° 55′ W 150 feet; thence S 27° 15′ E 265 feet more or less to point on E line of SW ¼ of said section; thence S 115 feet along E line of SW ¼ of said section; thence N 56° 55′ W 135 feet; thence N 31° 45′ W 410 feet; thence N 50° 45′ W 830 feet; thence N 37° 45′ W 220 feet more or less to point on N line of SW ¼ of said section; thence W 570 feet along N line of SW ¼ of said section; thence S 49° 10′ W 490 feet; thence S 31° 15′ W 370 feet; thence S 58° 35′ W 370 feet more or less to point on W line of said section; thence N 3460 feet more or less along W line of said section to place of beginning.

Section 14

The following lands in Sec. 14, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at a point on S line of Sec. 14, 1390 feet W of SE corner thereof; thence W 570 feet along S line of said section; thence N 43° 15′ W 115 feet; thence N 13° 15′ E 350 feet; thence N 24° 10′ W 180 feet; thence N 62° 00′ W 345 feet; thence N 4° 00′ W 50 feet; thence N 78° 00′ E 190 feet; thence N 25° 00′ E 100 feet; thence N 20° 25′ W 365 feet; thence N 7° 40′ E 495 feet; thence N 24° 00′ W 260 feet; thence N 50° 25′ W 500 feet; thence N 33° 55′ E 60 feet; thence S 74° 30′ E 740 feet; thence S 1° 35′ W 910 feet; thence S 25° 30′ E 580 feet; thence S 17° 00′ W 390 feet; thence S 36° 10′ E 365 feet; thence S 85° 00′ E 200 feet; thence southerly 45 feet more or less to place of beginning.

Section 16

The following lands in Sec. 16, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 16, 1540 feet E of NW corner thereof; thence E 1160 feet along N line of said section; thence S 9° 50′ E 425 feet; thence S 14° 20′ W 840 feet; thence S 1° 00′ E 80 feet; thence S 89° 45′

W 110 feet; thence S 27° 45′ W 500 feet; thence S 7° 45′ E 870 feet more or less to point on S line of NW ¼ of said section; thence S 20° 40′ E 410 feet; thence S 11° 30′ E 610 feet more or less to point on E line of SW ¼ of said section; thence S 1645 feet more or less along E line of said SW ¼ to point on S line of said section; thence W 370 feet more or less along S line of said section to point on E line of the Municipal Corporation of West Milton; thence northerly 1410 feet more or less along E line of said Corporation to corner thereof; thence westerly 770 feet more or less along N line of said Corporation to point 620 feet E of point where said N line of Corporation turns northerly along center line of Miami Street of said Corporation; thence N 26° 30′ E 360 feet; thence N 12° 15′ W 145 feet; thence N 51° 00′ W 145 feet; thence due N 60 feet; thence N 46° 10′ E 100 feet; thence N 7° 15′ W 530 feet more or less to point on S line of NW ¼ of said section; thence N 13° 15′ W 850 feet; thence N 8° 45′ E 480 feet; thence N 40° 30′ E 235 feet; thence N 20° 30′ W 415 feet; thence S 71° 15′ E 315 feet; thence northerly 840 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 16, 435 feet W of NE corner thereof; thence S 4° 25′ W 335 feet; thence S 28° 50′ W 190 feet; thence S 10° 15′ E 390 feet; thence S 51° 05′ E 100 feet; thence S 15° 00′ E 150 feet; thence N 61° 10′ W 270 feet; thence N 33° 45′ W 320 feet; thence N 74° 00′ E 125 feet; thence N 5° 00′ E 280 feet; thence N 23° 40′ W 170 feet; thence N 70° 00′ W 440 feet; thence N 4° 10′ W 70 feet more or less to point on N line of said section; thence E 690 feet more or less along N line of said section to place of beginning.

Section 21

The following lands in Sec. 21, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 21; thence W 2045 feet along S line of said section; thence N 31° 30′ W 720 feet; thence N 53° 25′ W 330 feet, thence N 74° 30′ W 160 feet; thence N 38° 35′ E 120 feet; thence N 27° 45′ W 375 feet; thence N 53° 00′ W 105 feet; thence N 14° 50′ W 240 feet more or less to point on S line of Municipal Corporation of West Milton; thence easterly 1165 feet more or less along S line of said Corporation to SE corner thereof; thence northerly 4085 feet more or less along E line of said Corporation to point on N line of said section; thence E 395 feet along N line of said section; thence S 13° 05′ E 610 feet; thence S 23° 00′ E 775 feet; thence S 9° 10′ E 400 feet; thence S 21° 15′ E 305 feet; thence S 62° 30′ E 70 feet; thence S 0° 30′ W 155 feet; thence S 18° 00′ E 475 feet; thence S 44° 00′ E 150 feet; thence S 0° 30′ W 120 feet; thence S 23° 35′ E 450 feet; thence S 46° 15′ E 180 feet; thence S 26° 15′ E 270 feet; thence S 36° 30′ E 925 feet; thence S 34° 00′ E 320 feet; thence S 45° 00′ E 510 feet; thence S 38° 15′ E 180 feet; thence N 87° 00′ E 60 feet; thence S 10° 45′ W 115 feet; thence S 60° 00′ E 130 feet more or less to point on E line of said section; thence S 115 feet more or less along E line of said section to place of beginning.

Section 23

The following lands in Sec. 23, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 23; thence W 1335 feet along S line of said section; thence N 43° 00′ E 420 feet; thence due N 185 feet; thence N

53° 15′ E 70 feet; thence S 68° 30′ E 350 feet; thence N 13° 05′ W 200 feet; thence N 58° 10′ W 450 feet; thence N 47° 20′ E 235 feet; thence N 1° 15′ W 240 feet; thence N 52° 45′ W 385 feet; thence N 72° 00′ W 220 feet; thence N 5° 45′ E 240 feet; thence N 53° 00′ W 350 feet; thence N 77° 55′ W 235 feet; thence S 65° 50′ W 210 feet; thence N 12° 45′ W 350 feet; thence N 36° 00′ W 230 feet; thence N 42° 00′ E 60 feet; thence S 64° 10′ E 200 feet; thence N 25° 15′ E 360 feet more or less to point on S line of highway; thence N 56° 15′ W 490 feet; thence N 32° 45′ E 100 feet; thence S 65° 30′ E 550 feet; thence S 89° 35′ E 130 feet; thence S 42° 50′ E 130 feet more or less to point on N line of highway; thence N 89° 30′ E 265 feet along N line of highway; thence N 19° 45′ W 540 feet; thence N 73° 25′ E 185 feet; thence N 19° 20′ W 1010 feet; thence N 69° 25′ E 115 feet; thence N 47° 00′ W 270 feet; thence N 8° 15′ W 510 feet; thence N 45° 20′ W 150 feet; thence N 84° 05′ W 220 feet; thence N 13° 45′ W 50 feet; thence N 64° 45′ E 260 feet; thence N 7° 15′ W 130 feet; thence N 43° 15′ W 145 feet more or less to point on N line of said section; thence E 570 feet along N line of said section; thence S 42° 00′ W 250 feet; thence S 27° 30′ E 470 feet; thence S 24° 05′ E 820 feet; thence N 53° 05′ E 210 feet; thence N 2° 00′ W 210 feet; thence N 70° 05′ E 490 feet; thence S 19° 50′ E 100 feet; thence S 67° 20′ W 315 feet; thence S 16° 40′ E 115 feet; thence S 77° 30′ E 245 feet; thence N 72° 45′ E 280 feet; thence S 19° 00′ E 35 feet; thence S 55° 10′ W 395 feet; thence N 51° 00′ W 170 feet; thence S 48° 00′ W 285 feet; thence S 22° 25′ E 275 feet; thence S 6° 00′ E 175 feet; thence S 61° 15′ E 300 feet; thence S 1° 40′ E 100 feet; thence S 87° 30′ W 290 feet more or less to point on W line of highway; thence southerly 2315 feet more or less along W line of said highway to point on E line of said section; thence S 1215 feet more or less along E line of said section to place of beginning.

Section 26

The following lands in Sec. 26, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 26; thence S 1625 feet along E line of said section; thence S 47° 50′ W 190 feet; thence S 60° 55′ W 365 feet; thence S 62° 40′ E 190 feet; thence S 41° 40′ E 195 feet; thence S 0° 30′ E 280 feet; thence N 49° 45′ E 220 feet more or less to point on E line of said section; thence S 2790 feet more or less along E line of said section to SE corner thereof; thence W 5150 feet along S line of said section; thence N 13° 35′ E 185 feet; thence N 48° 25′ E 165 feet; thence N 68° 00′ E 405 feet; thence N 33° 05′ E 150 feet; thence N 51° 20′ E 250 feet; thence N 2° 50′ E 230 feet; thence N 15° 00′ E 310 feet; thence N 60° 00′ E 460 feet; thence N 7° 35′ W 180 feet; thence N 16° 45′ E 550 feet; thence N 89° 20′ E 235 feet; thence S 54° 15′ E 510 feet; thence S 89° 30′ E 210 feet; thence S 67° 00′ E 320 feet; thence N 67° 10′ E 200 feet; thence N 83° 45′ E 145 feet; thence N 36° 20′ E 80 feet; thence N 53° 25′ W 215 feet; thence N 7° 35′ W 180 feet; thence N 75° 30′ E 180 feet; thence N 35° 35′ W 190 feet; thence N 24° 30′ E 120 feet more or less to a point on N line of SE ¼ of said section; thence E 230 feet along N line of SE ¼ of said section; thence N 58° 20′ E 285 feet; thence N 7° 05′ E 280 feet; thence N 62° 45′ W 100 feet; thence N 12° 25′ E 240 feet; thence N 47° 50′ E 540 feet; thence N 5° 35′ W 140 feet; thenc N 63° 20′ W 280 feet; thence N 3° 35′ W 100 feet; thence S 86° 20′ W 400 feet; thence N 22° 50′ W 110 feet; thence N 53° 35′ E 345 feet;

thence S 77° 00′ E 420 feet; thence N 20° 20′ E 580 feet; thence N 58° 30′ E 380 feet; thence N 32° 40′ W 145 feet; thence S 82° 40′ W 315 feet; thence N 85° 25′ W 390 feet; thence N 3° 10′ E 115 feet more or less to point on N line of said section; thence E 1575 feet more or less along N line of said section to place of beginning.

Section 27

The following lands in Sec. 27, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 27; thence E 225 feet along N line of said section; thence S 54° 20′ E 725 feet; thence S 14° 30′ E 110 feet; thence S 43° 45′ E 290 feet; thence S 22° 20′ E 350 feet; thence S 32° 45′ E 1190 feet; thence S 30° 20′ E 765 feet; thence S 25° 00′ E 200 feet; thence S 39° 05′ E 590 feet more or less to point on E line of SW ¼ of said section; thence S 50° 30′ E 1670 feet; thence S 62° 10′ E 90 feet; thence S 22° 40′ E 210 feet; thence S 45° 20′ E 260 feet; thence S 74° 40′ E 660 feet; thence N 76° 45′ E 210 feet; thence S 61° 05′ E 150 feet more or less to point on S line of said section; thence W 5200 feet more or less along S line of said section to SW corner thereof; thence N 5050 feet more or less along W line of said section to place of beginning.

Section 28

The following lands in Sec. 28, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 28; thence S 3560 feet along E line of said section; thence N 19° 25′ W 245 feet; thence N 0° 20′ E 190 feet; thence N 73° 40′ W 275 feet; thence S 86° 10′ W 230 feet; thence N 0° 30′ W 250 feet; thence N 46° 15′ W 80 feet; thence S 85° 00′ W 250 feet; thence N 5° 40′ W 50 feet; thence N 64° 00′ E 215 feet; thence N 24° 15′ E 65 feet; thence N 53° 25′ E 240 feet; thence N 18° 30′ W 580 feet; thence N 60° 10′ W 330 feet; thence N 14° 10′ W 290 feet; thence N 43° 15′ W 340 feet; thence N 37° 00 W 825 feet; thence N 31° 10′ W 620 feet more or less to point on N line of said section; thence E 2030 feet more or less along N line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 28; thence W 550 feet along S line of said section; thence N 20° 20′ W 160 feet; thence N 1° 45′ E 150 feet; thence N 40° 40′ W 410 feet; thence N 36° 45′ E 180 feet; thence S 63° 10′ E 470 feet; thence N 64° 45′ E 120 feet; thence N 39° 30′ E 475 feet more or less to point on E line of said section; thence S 950 feet more or less along E line of said section to place of beginning.

Section 33

The following lands in Sec. 33, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 33; thence S 5300 feet more or less along E line of said section to SE corner thereof; thence W 1885 feet along S line of said section; thence N 33° 20′ E 100 feet; thence N 71° 05′ E 145 feet; thence N 36° 10′ E 230 feet; thence due E 340 feet; thence N 56° 35′ E 225 feet; thence N 39° 40′ E 255 feet; thence N 1° 45′ W 80 feet; thence N 22° 55′ E 200 feet; thence N 77° 50′ E 260 feet; thence N 3° 30′ E 90 feet; thence S

88° 05′ E 100 feet; thence N 10° 25′ E 350 feet; thence N 14° 15′ E 1070 feet; thence N 2° 15′ E 260 feet more or less to point on S line of NE ¼ of said section; thence N 39° 30′ W 225 feet; thence N 47° 10′ E 135 feet; thence N 5° 00′ W 230 feet; thence N 43° 00′ W 160 feet; thence N 77° 20′ W 160 feet; thence N 2° 10′ W 65 feet; thence N 87° 10′ E 165 feet; thence N 10° 15′ E 340 feet; thence N 39° 30′ W 95 feet; thence N 63° 50′ E 90 feet; thence N 29° 35′ W 310 feet; thence N 20° 40′ W 560 feet; thence N 18° 05′ W 450 feet; thence N 8° 45′ W 250 feet more or less to point on N line of said section; thence E 650 feet more or less along N line of said section to place of beginning.

Section 34

All lands in Sec. 34, T 6 N, R 5 E, 1st P. M.

Section 35

The following lands in Sec. 35, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 35; thence E 5285 feet more or less along N line of said section to NE corner thereof; thence S 980 feet along E line of said section; thence N 71° 30′ W 500 feet; thence S 54° 55′ W 850 feet; thence S 18° 50′ W 120 feet; thence S 40° 30′ E 150 feet; thence S 68° 25′ W 175 feet; thence S 0° 45′ E 100 feet; thence S 38° 35′ E 170 feet; thence S 71° 35′ W 135 feet; thence S 32° 00′ W 265 feet; thence S 1° 00′ W 310 feet; thence S 21° 45′ W 370 feet; thence S 20° 20′ E 285 feet; thence S 8° 35′ E 440 feet; thence N 79° 35′ E 140 feet; thence S 25° 45′ E 90 feet; thence S 69° 30′ W 320 feet; thence S 40° 35′ E 240 feet; thence S 81° 10′ E 170 feet; thence S 29° 35′ E 815 feet; thence S 36° 50′ E 235 feet; thence S 64° 15′ E 240 feet; thence N 78° 45′ E 160 feet more or less to point on W line of Municipal Corporation of Frederickstown; thence southerly 480 feet more or less along W line of said Corporation to point on S line of said section; thence N 71° 45′ W 1000 feet; thence S 85° 10′ W 300 feet; thence S 0° 30′ E 75 feet; thence S 77° 30′ W 155 feet; thence S 30° 35′ W 215 feet more or less to point on S line of said section; thence W 3420 feet more or less along S line of said section to SW corner thereof; thence N 5250 feet more or less along W line of said section to place of beginning.

MONROE TOWNSHIP

Such lands in T 6 N, R 5 E, 1st P. M., Monroe Township, are located in Sections 24 and 25 as follows:

Section 24

The following lands in Sec. 24, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 24; thence N 1330 feet along W line of said section; thence due E 330 feet; thence S 35° 30′ E 80 feet; thence S 48° 20′ W 140 feet; thence S 4° 50′ W 225 feet; thence N 60° 50′ E 755 feet; thence due E 75 feet; thence S 34° 25′ W 105 feet; thence S 53° 35′ W 475 feet; thence S 31° 30′ W 270 feet; thence S 4° 10′ E 150 feet; thence S 78° 30′ E 345 feet; thence N 70° 45′ E 575 feet; thence N 51° 30′ E 420 feet; thence S 1° 00′ E 165 feet; thence S 39° 45′ W 185 feet; thence S 59° 30′ W 580 feet; thence S 31° 10′ W 230 feet; thence N 86° 30′ E 210 feet; thence S 7° 10′ E 140 feet more or less to point on S line of said section; thence W 1110 feet more or less along S line of said section to place of beginning.

Section 25

The following lands in Sec. 25, T 6 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 25; thence E 1250 feet along N line of said section; thence S 5° 35′ W 175 feet; thence S 59° 30′ E 330 feet; thence S 51° 30′ E 430 feet; thence N 61° 40′ E 510 feet; thence S 29° 10′ E 95 feet; thence S 54° 45′ W 520 feet; thence S 5° 25′ W 145 feet; thence S 62° 50′ W 80 feet; thence N 41° 30′ W 340 feet; thence N 57° 50′ W 260 feet; thence S 72° 50′ W 550 feet; thence S 10° 00′ W 120 feet; thence S 33° 00′ E 240 feet; thence S 56° 15′ W 60 feet; thence N 63° 10′ W 415 feet; thence S 47° 20′ W 495 feet; thence S 28° 30′ W 190 feet; thence due W 100 feet more or less to point on W line of said section; thence N 1320 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 25, 3135 feet S of NW corner thereof; thence S 79° 45′ E 475 feet; thence S 2° 10′ E 240 feet; thence S 63° 00′ W 390 feet; thence S 78° 10′ E 210 feet; thence S 7° 20′ E 230 feet; thence S 64° 20′ W 390 feet more or less to point on W line of said section; thence N 940 feet more or less along W line of said section to place of beginning.

NEWTON TOWNSHIP

Such lands in T 7 N, R 5 E, 1st P. M., Newton Township, are located in Sections 5, 8, 17, 18, 19, 20, 28, 29, 30, 31, 32, and 33 as follows:

Section 5

The following lands in Sec. 5, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 5, 660 feet E of SW corner thereof; thence due N 220 feet; thence S 87° 40′ W 285 feet; thence N 1° 45′ W 115 feet; thence N 38° 22′ W 260 feet; thence N 53° 00′ W 275 feet more or less to point on W line of said section; thence N 150 feet along said W line; thence N 47° 30′ E 490 feet; thence N 19° 45′ E 225 feet; thence N 7° 00′ W 685 feet; thence N 73° 00′ W 70 feet; thence N 3° 20′ W 1130 feet; thence N 15° 00′ W 210 feet; thence N 7° 45′ E 120 feet; thence N 79° 00′ E 45 feet; thence S 14° 20′ E 445 feet; thence S 77° 00′ E 160 feet; thence N 28° 35′ E 535 feet; thence N 11° 50′ E 335 feet; thence N 61° 30′ E 50 feet; thence N 18° 50′ W 975 feet; thence N 10° 50′ W 455 feet more or less to point on N line of said section; thence E 480 feet along said N line; thence S 35° 00′ E 395 feet more or less to point on E line of highway; thence southerly 645 feet along said E line of highway; thence S 89° 00′ W 90 feet; thence S 6° 45′ E 220 feet; thence S 8° 45′ W 700 feet; thence S 4° 00′ E 170 feet; thence S 4° 00′ W 430 feet; thence S 26° 55′ W 600 feet; thence S 21° 20′ E 365 feet; thence S 13° 00′ E 415 feet; thence S 31° 30′ E 280 feet; thence S 74° 30′ E 75 feet; thence S 10° 00′ E 250 feet; thence S 4° 30′ W 490 feet; thence S 15° 20′ W 455 feet; thence S 1° 30′ W 140 feet more or less to point on S line of said section; thence W 670 feet more or less along said S line to place of beginning.

Section 8

The following lands in Sec. 8, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 8, 590 feet E of NW corner thereof; thence E 1500 feet along N line of said section; thence S 1° 30′ E 145 feet; thence S 64° 00′ W 570 feet; thence N 87° 45′ W 200 feet; thence N 50° 10′ W 200 feet; thence S 12° 30′ W 140 feet; thence S 3° 30′ E 365 feet; thence S 1° 00′ W 430 feet; thence S 72° 10′ W 55 feet; thence S 20° 00′ E 665 feet; thence N 77° 20′ E 125 feet; thence S 63° 25′ E 155 feet; thence S 7° 10′ E 40 feet; thence S 82° 45′ W 235 feet; thence S 12° 55′ W 180 feet; thence S 6° 20′ E 380 feet; thence S 88° 20′ E 60 feet; thence S 11° 10′ E 65 feet; thence S 30° 10′ W 85 feet more or less to point on S line of NW ¼ of said section; thence S 14° 30′ W 200 feet; thence S 10° 30′ E 270 feet; thence S 76° 15′ E 150 feet; thence S 47° 30′ W 210 feet; thence due S 475 feet; thence N 65° 20′ E 325 feet; thence S 33° 00′ E 125 feet; thence S 60° 40′ W 415 feet; thence S 1° 05′ E 220 feet; thence S 11° 40′ W 495 feet; thence S 6° 55′ W 715 feet more or less to point on S line of said section; thence W 735 feet along said S line; thence N 10° 00′ E 95 feet; thence N 10° 35′ W 430 feet; thence N 5° 40′ E 600 feet; thence N 46° 20′ W 130 feet; thence S 62° 05′ W 190 feet; thence N 25° 45′ W 60 feet; thence N 46° 30′ E 240 feet; thence N 20° 00′ E 120 feet; thence N 32° 45′ W 115 feet; thence N 22° 40′ W 295 feet; thence N 3° 30′ W 160 feet; thence S 42° 05′ E 240 feet; thence S 83° 30′ E 115 feet; thence N 25° 30′ E 105 feet; thence N 12° 10′ E 220 feet; thence N 1° 00′ E 330 feet; thence N 7° 20′ W 240 feet more or less to point on N line of SW ¼ of said section; thence N 10° 55′ E 305 feet; thence N 36° 00′ W 440 feet; thence N 5° 30′ E 340 feet; thence N 10° 00′ W 715 feet; thence N 2° 10′ E 320 feet; thence N 34° 00′ E 180 feet; thence N 12° 30′ E 330 feet; thence northeasterly 190 feet more or less to place of beginning.

Section 17

The following lands in Sec. 17, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 17, 385 feet E of NW corner thereof; thence E 735 feet along N line of said section; thence S 6° 40′ W 865 feet; thence S 37° 30′ E 410 feet; thence S 59° 50′ W 80 feet; thence N 49° 15′ W 240 feet; thence S 34° 50′ W 150 feet; thence S 20° 30′ W 1060 feet; thence S 12° 40′ W 890 feet; thence S 18° 15′ W 735 feet; thence S 34° 30′ W 135 feet more or less to point on W line of said section; thence N 3155 feet along said W line; thence S 18° 30′ E 260 feet; thence S 88° 30′ E 110 feet; thence northerly 980 feet more or less to place of beginning.

Section 18

The following lands in Sec. 18, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 18, 465 feet E of SW corner thereof; thence N 61° 15′ E 270 feet; thence N 84° 00′ E 460 feet; thence S 86° 10′ E 360 feet; thence N 49° 30′ E 190 feet; thence N 19° 00′ W 160 feet; thence N 82° 30′ E 150 feet; thence N 40° 00′ E 480 feet; thence N 56° 50′ E 280 feet; thence N 43° 00′ E 240 feet; thence N 64° 30′ E 630 feet; thence N 45° 00′ W 55 feet; thence S 75° 50′ W 300 feet; thence N 5° 30′ E 240 feet; thence S 82° 20′ E 345 feet; thence N 62° 20′ E 290 feet; thence N 72° 45′ E

340 feet; thence N 53° 30′ E 150 feet; thence N 3° 00′ E 125 feet; thence N 82° 50′ E 185 feet; thence N 50° 30′ E 180 feet; thence N 13° 30′ E 150 feet; thence N 67° 30′ W 215 feet; thence N 33° 45′ W 235 feet; thence N 60° 30′ W 225 feet more or less to point on N line of SE ¼ of said section; thence E 205 feet along N line of SE ¼ of said section; thence S 57° 15′ E 150 feet; thence N 55° 10′ E 130 feet more or less to point on N line of SE ¼ of said section; thence S 16° 00′ E 180 feet; thence S 67° 10′ E 140 feet; thence N 20° 40′ E 460 feet; thence S 48° 45′ E 210 feet; thence N 39° 50′ E 525 feet; thence N 21° 45′ E 305 feet; thence N 26° 50′ E 265 feet; thence S 60° 30′ W 290 feet; thence N 41° 20′ W 215 feet; thence N 51° 05′ E 225 feet; thence N 74° 10′ W 370 feet; thence S 72° 50′ W 140 feet; thence N 1° 00′ E 210 feet; thence S 83° 40′ E 165 feet; thence N 55° 00′ E 560 feet; thence N 33° 00′ E 215 feet more or less to point on E line of said section; thence S 3155 feet along said E line; thence S 34° 50′ W 270 feet; thence S 11° 20′ E 290 feet; thence S 19° 15′ W 200 feet; thence S 5° 30′ W 300 feet; thence S 1° 30′ E 390 feet more or less to point on S line of said section; thence W 4560 feet more or less along said S line to place of beginning.

Section 19

The following lands in Sec. 19, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at the NE corner of Sec. 19; thence S 5295 feet more or less along E line of said section to SE corner thereof; thence W 2125 feet along S line of said section; thence N 43° 35′ W 870 feet more or less to point on W line of SE ¼ of said section; thence S 42° 45′ W 620 feet; thence S 71° 00′ W 360 feet; thence N 3° 30′ W 100 feet; thence N 55° 20′ E 340 feet; thence N 18° 00′ E 270 feet; thence N 82° 00′ W 190 feet; thence N 61° 45′ E 180 feet; thence N 54° 45′ W 565 feet; thence S 76° 45′ W 185 feet; thence N 32° 20′ W 190 feet; thence S 87° 10′ W 450 feet; thence N 52° 00′ E 470 feet; thence N 20° 00′ W 200 feet; thence N 8° 15′ W 240 feet; thence N 18° 30′ E 250 feet; thence N 17° 00′ W 160 feet; thence N 52° 15′ W 310 feet; thence N 86° 30′ W 155 feet; thence S 62° 50′ W 160 feet; thence N 25° 00′ W 60 feet; thence N 48° 20′ E 270 feet; thence S 85° 50′ E 215 feet; thence S 60° 30′ E 165 feet; thence N 9° 45′ E 160 feet more or less to point on N line of SW ¼ of said section; thence E 615 feet along said N line of SW ¼; thence N 73° 20′ E 290 feet; thence N 83° 20′ W 450 feet; thence N 58° 10′ W 225 feet; thence N 27° 30′ W 240 feet; thence N 17° 45′ W 590 feet; thence N 27° 30′ W 140 feet; thence N 74° 55′ W 155 feet; thence S 81° 30′ W 320 feet; thence N 12° 30′ W 35 feet; thence N 62° 50′ E 320 feet; thence N 85° 30′ E 225 feet; thence N 5° 00′ E 480 feet; thence N 2° 10′ E 195 feet; thence N 19° 50′ E 540 feet; thence N 87° 00′ W 250 feet; thence N 63° 45′ W 205 feet more or less to point on N line of said section; thence E 3995 feet more or less along said N line to place of beginning.

Section 20

The following lands in Sec. 20, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 20; thence N 2665 feet more or less along W line of said section to W ¼ corner; thence E 480 feet along N line of SW ¼ of said section; thence S 27° 00′ E 125 feet; thence S 52° 45′ E 240 feet; thence S 8° 30′ E 330 feet; thence S 44° 00′ E 115 feet; thence S 12° 00′

E 410 feet; thence S 40° 10′ E 980 feet; thence S 82° 45′ E 200 feet; thence N 18° 30′ E 135 feet; thence S 55° 00′ E 100 feet more or less to a point on W right-of-way line of the C. H. & D. Ry. Co.; thence southerly 870 feet more or less along said W right-of-way line to point on S line of said section; thence W 1915 feet more or less along said S line to place of beginning.

Section 28

The following lands in Sec. 28, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 28; thence N 3200 feet along W line of said section; thence S 57° 45′ E 370 feet; thence N 88° 15′ E 370 feet; thence S 25° 00′ E 100 feet; thence S 77° 45′ W 230 feet; thence S 44° 00′ E 320 feet more or less to point on S line of NW ¼ of said section; thence S 21° 05′ E 670 feet; thence S 3° 35′ W 310 feet; thence N 80° 35′ E 340 feet; thence S 49° 30′ W 480 feet; thence S 16° 00′ W 640 feet; thence S 1° 40′ E 220 feet; thence N 85° 00′ E 430 feet; thence N 54° 10′ E 960 feet; thence S 45° 05′ E 120 feet; thence S 40° 10′ W 670 feet; thence S 49° 00′ E 230 feet; thence S 57° 05′ W 540 feet; thence S 28° 00′ E 170 feet more or less to point on S line of said section; thence W 1310 feet more or less along said S line to place of beginning.

Section 29

The following lands in Sec. 29, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 29; thence E 1985 feet more or less along N line of said section to point on E right-of-way line of C. H. & D. Ry. Co.; thence southerly 400 feet along said E right-of-way line; thence S 20° 20′ E 580 feet; thence S 76° 15′ E 180 feet; thence S 17° 00′ E 715 feet more or less to point on W line of NE ¼ of said section; thence N 67° 00′ E 165 feet; thence S 25° 10′ E 180 feet; thence N 77° 30′ E 95 feet; thence S 26° 50′ E 280 feet; thence N 89° 00′ E 90 feet; thence N 20° 10′ E 400 feet; thence N 23° 45′ W 375 feet; thence N 41° 45′ W 445 feet; thence N 20° 15′ W 165 feet; thence N 42° 30′ W 300 feet more or less to point on W line of highway; thence northerly 380 feet along said W line of highway; thence S 48° 15′ E 910 feet; thence S 55° 20′ E 860 feet; thence S 24° 05′ E 370 feet; thence S 81° 00′ E 145 feet; thence N 11° 50′ E 135 feet; thence N 56° 10′ W 180 feet; thence N 28° 00′ W 930 feet; thence N 26° 30′ E 200 feet; thence N 78° 15′ E 585 feet; thence N 89° 30′ E 325 feet; thence N 64° 45′ E 405 feet; thence N 16° 10′ E 140 feet more or less to point on N line of said section; thence E 135 feet more or less along said N line to NE corner thereof; thence S 805 feet along E line of said section; thence S 43° 05′ W 530 feet; thence S 63° 30′ W 350 feet; thence S 26° 00′ E 455 feet; thence S 58° 00′ E 615 feet more or less to point on E line of said section; thence S 3200 feet more or less along said E line to SE corner of said section; thence W 5335 feet more or less along S line of said section to SW corner thereof; thence N 110 feet along W line of said section; thence N 62° 00′ E 170 feet; thence N 47° 50′ E 240 feet; thence N 5° 00′ W 265 feet; thence N 61° 30′ E 290 feet; thence S 32° 10′ E 220 feet; thence S 79° 00′ E 665 feet; thence N 81° 50′ E 215 feet; thence N 40° 30′ E 305 feet; thence N 36° 45′ W 320 feet; thence N 86° 00′ W 230 feet; thence N 1° 30′ W 120 feet; thence S 79° 50′ E 660 feet; thence S 2° 30′ W 200 feet; thence S 41° 10′ E 230 feet; thence N 69° 15′ E

545 feet more or less to point on E line of SW ¼ of said section; thence N 335 feet along said E line of SW ¼; thence N 52° 30′ W 590 feet; thence N 46° 35′ W 1080 feet; thence N 74° 35′ W 175 feet; thence S 55° 10′ W 830 feet; thence N 37° 40′ W 570 feet; thence N 5° 00′ W 185 feet; thence S 48° 50′ W 250 feet more or less to point on W line of said section; thence N 3050 feet more or less along said W line to place of beginning.

Section 30

The following lands in Sec. 30, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 30; thence S 3050 feet along E line of said section; thence S 48° 45′ W 200 feet; thence S 61° 35′ W 380 feet; thence S 80° 30′ W 370 feet; thence N 15° 35′ W 75 feet; thence N 57° 30′ E 200 feet; thence N 81° 45′ E 155 feet; thence N 49° 10′ E 590 feet; thence N 1° 00′ W 120 feet more or less to point on N line of SE ¼ of said section; thence N 20° 00′ W 430 feet; thence N 3° 50′ E 540 feet; thence S 55° 30′ W 620 feet; thence S 15° 00′ W 255 feet; thence N 81° 00′ W 260 feet; thence N 23° 10′ W 240 feet; thence N 81° 55′ E 210 feet; thence N 33° 10′ E 370 feet; thence N 47° 45′ E 425 feet; thence N 70° 00′ W 110 feet; thence S 71° 55′ W 260 feet; thence N 25° 05′ E 290 feet; thence N 0° 45′ E 80 feet; thence N 48° 05′ W 250 feet; thence N 16° 30′ W 200 feet; thence N 72° 35′ W 170 feet; thence S 60° 00′ W 140 feet; thence N 76° 35′ W 380 feet; thence N 66° 20′ E 240 feet; thence N 65° 20′ W 295 feet; thence N 46° 45′ W 310 feet; thence N 76° 50′ W 100 feet; thence S 33° 00′ W 135 feet; thence N 35° 15′ W 150 feet; thence N 12° 20′ W 240 feet more or less to point on N line of said section; thence E 2130 feet more or less along said N line to place of beginning.

Section 31

The following lands in Sec. 31, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 31; thence S 210 feet along E line of said section; thence S 61° 55′ W 270 feet; thence S 84° 25′ W 250 feet; thence S 26° 55′ W 330 feet; thence S 79° 10′ W 445 feet; thence S 60° 25′ W 190 feet; thence N 1° 05′ W 115 feet; thence N 52° 35′ E 1180 feet more or less to point on N line of said section; thence E 300 feet more or less along said N line to place of beginning.

Section 32

The following lands in Sec. 32, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 32; thence S 5290 feet more or less along E line of said section to SE corner thereof; thence W 545 feet along S line of said section; thence N 3° 10′ W 850 feet; thence S 87° 20′ W 395 feet; thence N 24° 40′ W 1470 feet more or less to point on E right-of-way line of D. C. & P. Tr. Co.; thence northerly 985 feet along said E right-of-way line; thence N 28° 20′ W 925 feet; thence N 36° 45′ W 290 feet; thence S 54° 35′ W 315 feet; thence S 83° 00′ W 260 feet more or less to point on W line of NE ¼ of said section; thence N 300 feet along said W line of NE ¼; thence S 72° 30′ W 120 feet; thence N 72° 20′ W 430 feet; thence N 51° 30′ W 400 feet; thence N 7° 10′ W 600 feet more or less to

point on N line of said section; thence E 3600 feet more or less along said N line to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 32; thence E 1610 feet along N line of said section; thence S 38° 45′ W 170 feet; thence S 61° 00′ W 210 feet; thence N 8° 15′ W 200 feet; thence S 60° 20′ W 270 feet; thence N 87° 55′ W 300 feet; thence S 53° 20′ W 200 feet; thence N 50° 35′ W 130 feet; thence S 46° 45′ W 650 feet more or less to point on W line of said section; thence N 600 feet more or less along said W line to place of beginning.

Section 33

The following lands in Sec. 33, T 7 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 33; thence E 1310 feet along N line of said section; thence S 3° 50′ E 120 feet; thence S 69° 15′ E 170 feet; thence S 41° 50′ E 1740 feet more or less to point on E line of NW ¼ of said section; thence S 42° 10′ E 200 feet; thence S 26° 05′ E 480 feet; thence S 54° 30′ E 410 feet; thence N 56° 55′ E 480 feet; thence N 28° 45′ E 570 feet; thence N 36° 30′ W 170 feet; thence N 54° 45′ E 560 feet; thence N 19° 10′ E 400 feet; thence S 81° 40′ E 95 feet; thence S 4° 45′ W 430 feet; thence S 56° 00′ W 330 feet; thence S 12° 35′ W 600 feet; thence S 47° 15′ W 215 feet; thence S 27° 05′ E 110 feet; thence N 71° 20′ E 285 feet; thence N 6° 25′ E 240 feet; thence N 70° 40′ E 360 feet; thence S 31° 35′ E 70 feet; thence S 61° 05′ W 270 feet; thence S 8° 45′ E 105 feet; thence N 80° 40′ E 360 feet; thence S 31° 10′ E 110 feet; thence S 80° 30′ W 190 feet; hence S 61° 35′ W 410 feet; thence S 81° 25′ W 155 feet; thence S 23° 50′ E 355 feet more or less to point on N line of SE ¼ of said section; thence W 660 feet along said N line of SE ¼; thence S 52° 35′ E 495 feet; thence S 39° 25′ E 510 feet; thence S 24° 05′ E 615 feet; thence S 45° 40′ E 360 feet; thence N 76° 15′ E 260 feet; thence S 35° 15′ W 300 feet; thence S 16° 45′ E 340 feet; thence S 23° 55′ W 305 feet; thence S 51° 25′ W 470 feet more or less to point on S line of said section; thence W 4515 feet more or less along S line of said section to SW corner thereof; thence N 5290 feet more or less along W line of said section to place of beginning.

NEWBERRY TOWNSHIP

Such lands in T 8 N, R 5 E, 1st P. M., Newberry Township, are located in Sections 31 and 32 as follows:

Section 31

The following lands in Sec. 31, T 8 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at E ¼ corner of Sec. 31; thence S 1710 feet along E line of said section; thence N 46° 00′ W 115 feet; thence N 17° 00′ W 60 feet; thence N 44° 00′ W 500 feet; thence N 64° 00′ W 255 feet; thence N 27° 15′ W 160 feet; thence N 60° 00′ W 200 feet; thence N 46° 50′ E 110 feet; thence N 1° 45′ W 470 feet; thence N 9° 00′ W 320 feet more or less to point on N line of SE ¼ of said section; thence easterly 900 feet more or less along said N line of SE ¼ to place of beginning.

Section 32

The following lands in Sec. 32, T 8 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 32, 850 feet N of SW corner thereof; thence N 1390 feet along W line of said section; thence S 59° 45′ E 160 feet; thence S 19° 15′ E 400 feet; thence S 27° 00′ E 420 feet; thence N 89° 00′ E 200 feet; thence S 30° 30′ E 190 feet; thence S 15° 00′ E 370 feet; thence S 7° 20′ E 335 feet; thence S 62° 15′ E 130 feet; thence S 9° 00′ E 175 feet; thence N 77° 30′ W 140 feet; thence S 19° 45′ E 350 feet more or less to point on S line of said section; thence W 480 feet along said S line; thence N 3° 15′ W 175 feet; thence N 30° 00′ W 160 feet; thence N 49° 10′ W 175 feet; thence N 31° 45′ W 355 feet; thence northwesterly 170 feet more or less to place of beginning.

MUNICIPAL CORPORATION OF WEST MILTON

The following lands within the corporate limits of the Municipal Corporation of West Milton, included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 16, T 6 N, R 5 E, 1st P. M., where E line of the Municipal Corporation of West Milton intersects S line of said section; thence southerly 4085 feet more or less along E line of said Corporation to SE corner thereof; thence westerly 1150 feet more or less along S line of said Corporation to point 200 feet E of E line of Miami Street; thence northerly 1510 feet more or less to SE corner of intersection of Washington Street and Taylor's Alley; thence northerly 2380 feet more or less along E line of Washington Street to S line of Tippecanoe Pike; thence N 37° 30′ W 145 feet; thence N 29° 45′ E 240 feet; thence N 3° 40′ W 195 feet; thence N 53° 00′ W 70 feet; thence N 32° 30′ E 75 feet; thence N 60° 30′ E 100 feet; thence N 28° 55′ E 175 feet; thence N 8° 45′ W 335 feet; thence N 81° 30′ W 90 feet; thence N 18° 00′ E 190 feet; thence N 7° 45′ W 90 feet; thence N 26° 30′ E 150 feet more or less to point on N line of said Corporation; thence easterly 770 feet more or less along said N corporation line to Corporation corner; thence southerly 1410 feet more or less along E line of said Corporation to place of beginning.

LOCKINGTON RETARDING BASIN

Lands now within the limits of The Miami Conservancy District which may be damaged or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the Lockington Retarding Basin, are located in Shelby County as follows: (Refer to Sheets Nos. 14, 15, 16, 17, 18, 19, and 20 of Exhibit No. 5 which are hereby made a part of the following descriptions.)

SHELBY COUNTY

Such lands in Shelby County are located in Washington, Loramie, Turtle Creek, and Cynthian Townships as follows:

WASHINGTON TOWNSHIP

Such lands in T 7 N, R 6 E, 1st P. M., Washington Township, are located in Sections 5, 6, 7. 8, 17, 18, 19, 20, 29, and 30 as follows:

Section 5

The following lands in Sec. 5, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 5, 1305 feet N of SW corner thereof; thence N 250 feet along W line of said section; thence N 29° 45′ E 130 feet; thence S 89° 30′ E 200 feet; thence N 27° 00′ E 220 feet; thence N 12° 50′ E 300 feet; thence N 56° 10′ W 120 feet; thence N 55° 10′ E 280 feet; thence N 33° 50′ E 200 feet; thence N 17° 20′ W 60 feet more or less to point on N line of SW ¼ of said section; thence E 105 feet along N line of said SW ¼; thence S 11° 00′ E 180 feet; thence S 29° 30′ W 270 feet; thence S 13° 20′ W 485 feet; thence S 84° 40′ E 340 feet; thence S 7° 30′ W 90 feet; thence N 88° 30′ W 415 feet; thence S 39° 15′ W 395 feet; thence westerly 200 feet more or less to place of beginning.

Section 6

The following lands in Sec. 6, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at N ¼ corner of Sec. 6; thence E 2340 feet along N line of said section; thence S 44° 30′ E 310 feet; thence S 6° 50′ W 440 feet; thence S 29° 15′ W 275 feet; thence S 51° 15′ W 450 feet; thence S 16° 30′ W 95 feet; thence S 24° 30′ E 330 feet; thence S 2° 45′ W 215 feet; thence S 40° 50′ W 280 feet; thence S 15° 30′ W 215 feet; thence S 39° 30′ E 100 feet; thence S 89° 35′ E 255 feet; thence S 1° 50′ E 135 feet; thence S 87° 30′ W 225 feet; thence S 64° 10′ W 140 feet; thence S 11° 10′ W 85 feet more or less to point on S line of NE ¼ of said section; thence S 8° 00′ E 750 feet; thence S 42° 50′ E 140 feet; thence N 44° 15′ E 155 feet; thence N 88° 20′ E 280 feet; thence S 60° 15′ E 290 feet; thence S 35° 20′ E 190 feet more or less to point on E line of said section; thence S 250 feet along E line of said section; thence S 88° 20′ W 340 feet; thence S 20° 55′ E 565 feet; thence S 27° 30′ W 250 feet; thence S 51° 00′ E 220 feet; thence S 19° 15′ E 200 feet; thence S 40° 30′ E 60 feet more or less to point on E line of said section; thence S 165 feet more or less along E line of said section to SE corner thereof; thence W 2755 feet more or less along S line of said section to SW corner of SE ¼ thereof; thence N 3730 feet along W line of E ½ of said section; thence N 75° 30′ W 185 feet; thence N 49° 15′ W 440 feet; thence N 71° 45′ W 290 feet; thence N 6° 35′ E 110 feet; thence N 84° 25′ E 375 feet; thence N 67° 40′ E 265 feet; thence N 45° 50′ E 210 feet more or less to point on E line of NW ¼ of said section; thence N 625 feet more or less along said E line of NW ¼ to place of beginning.

Section 7

The following lands in Sec. 7, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 7; thence S 5360 feet more or less along E line of said section to SE corner thereof; thence W 2640 feet more or less along S line of said section to S ¼ corner thereof; thence N 700 feet along W line of SE ¼ of said section; thence N 49° 30′ W 160 feet; thence N 16° 10′ E 145 feet; thence N 47° 00′ W 100 feet; thence S 66° 00′ W 195 feet; thence N 77° 00′ W 340 feet; thence S 80° 50′ W 120 feet; thence N 12° 15′ E 120 feet; thence N 73° 10′ E 390 feet; thence N 44° 30′ W 580 feet; thence N 27° 30′ W 305 feet; thence N 72° 30′ E 85 feet; thence S 73° 30′ E 180 feet; thence N 24° 30′ W 460 feet; thence N 10° 00′ E 120 feet; thence N 83° 10′ E 125 feet; thence S 16° 50′ E 380 feet; thence S 43° 30′ E 200 feet; thence S 89° 45′ E 125 feet; thence S 24° 30′ W 290 feet; thence S 39° 00′ E 120 feet; thence S 59° 00′ E 665 feet; thence N 3° 30′ E 385 feet; thence N 13° 45′ W 265 feet; thence S 83° 40′ E 180 feet; thence S 25° 30′ E 225 feet; thence S 4° 20′ W 315 feet; thence S 27° 15′ E 325 feet; thence N 79° 00′ E 60 feet; thence N 14° 00′ W 230 feet; thence N 32° 30′ E 200 feet; thence S 80° 00′ E 150 feet; thence S 23° 30′ E 75 feet; thence N 82° 00′ E 65 feet; thence N 7° 10′ W 400 feet; thence N 29° 30′ E 195 feet; thence N 0° 30′ W 110 feet; thence N 75° 50′ W 185 feet; thence N 8° 10′ W 605 feet more or less to point on N line of SE ¼ of said section; thence N 21° 30′ E 85 feet; thence N 77° 30′ W 315 feet; thence N 14° 15′ E 150 feet; thence N 84° 45′ E 330 feet; thence N 41° 40′ E 140 feet; thence N 37° 00′ W 85 feet; thence S 65° 30′ W 200 feet; thence N 26° 45′ W 135 feet; thence N 51° 35′ E 170 feet; thence N 34° 00′ W 45 feet; thence S 83° 15′ W 250 feet; thence N 3° 30′ W 310 feet; thence N 59° 20′ W 280 feet; thence N 20° 45′ E 125 feet; thence N 58° 10′ E 290 feet; thence N 1° 00′ W 365 feet; thence S 87° 30′ W 400 feet; thence N 9° 15′ E 210 feet; thence N 83° 00′ E 325 feet; thence N 21° 15′ W 240 feet; thence S 76° 00′ W 420 feet more or less to point on W line of NE ¼ of said section; thence N 590 feet more or less along said W line of NE ¼ to point on N line of said section; thence E 2750 feet more or less along N line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 7; thence N 1000 feet along W line of said section; thence S 53° 50′ E 435 feet; thence N 62° 20′ E 110 feet; thence S 47° 00′ E 70 feet; thence S 5° 15′ W 215 feet; thence N 70° 30′ E 165 feet; thence S 72° 00′ E 120 feet; thence S 0° 45′ W 200 feet; thence S 45° 00′ W 250 feet; thence S 60° 30′ E 120 feet; thence S 22° 00′ E 100 feet more or less to point on S line of said section; thence W 700 feet more or less along S line of said section to place of beginning.

Section 8

The following lands in Sec. 8, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 8, 960 feet S of NW corner thereof; thence S 73° 30′ E 255 feet; thence S 30° 15′ E 150 feet; thence S 25° 15′ W 620 feet; thence S 2° 00′ W 180 feet; thence S 55° 00′ E 130 feet; thence S 35° 10′ W 165 feet; thence S 22° 30′ E 60 feet more or less to point on N line of Lot 10, Village of Newburn; thence S 89° 30′ E 185 feet; thence N

71° 35′ E 470 feet; thence S 18° 00′ E 95 feet; thence S 51° 00′ W 220 feet; thence S 42° 00′ E 105 feet; thence S 85° 45′ W 355 feet; thence S 53° 00′ W 255 feet; thence N 84° 30′ W 80 feet more or less to point on W line of said section; thence N 1560 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 8, 1450 feet E of SW corner thereof; thence N 29° 00′ E 145 feet; thence N 56° 00′ E 435 feet; thence N 29° 40′ E 325 feet; thence N 7° 30′ E 295 feet; thence N 24° 15′ E 335 feet; thence S 87° 30′ E 95 feet; thence S 50° 30′ E 165 feet; thence N 62° 45′ E 110 feet more or less to point on E line of SW ¼ of said section; thence S 285 feet along said E line; thence N 54° 30′ W 240 feet; thence S 53° 15′ W 65 feet; thence S 19° 15′ E 360 feet; thence S 9° 00′ W 355 feet; thence S 18° 00′ W 330 feet more or less to point on S line of said section; thence W 810 feet more or less along S line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 8; thence N 2790 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence southerly 2930 feet more or less along W bank of said canal to point on S line of said section; thence W 580 feet more or less along S line of said section to place of beginning.

Section 17

The following lands in Sec. 17, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 17; thence E 475 feet along N line of said section; thence S 24° 30′ E 260 feet; thence S 3° 10′ W 350 feet; thence S 22° 10′ E 290 feet; thence S 53° 15′ W 310 feet; thence S 5° 55′ E 330 feet; thence N 88° 05′ W 345 feet more or less to point on W line of said section; thence N 1360 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 17, 1450 feet E of NW corner thereof; thence E 810 feet along N line of said section; thence S 34° 50′ W 190 feet; thence S 53° 00′ W 375 feet; thence S 33° 15′ E 460 feet; thence S 75° 20′ E 170 feet; thence S 57° 00′ W 305 feet; thence S 19° 20′ W 250 feet; thence S 14° 20′ E 415 feet; thence S 61° 00′ E 290 feet; thence S 27° 30′ E 235 feet; thence N 85° 45′ W 350 feet; thence N 5° 05′ W 150 feet; thence S 82° 45′ W 290 feet; thence N 73° 45′ W 165 feet more or less to point on E bank of M. & E. Canal; thence northwesterly 500 feet more or less along said E bank to point on N and S line 1170 feet E of NW corner of said section; thence due N 300 feet more or less to point 1170 feet E and 1130 feet S of NW corner of said section; thence N 18° 45′ E 80 feet; thence S 67° 00′ E 130 feet; thence N 3° 40′ W 965 feet; thence northeasterly 260 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of said Sec. 17; thence N 3090 feet along W line of said section; thence N 36° 05′ E 420 feet; thence N 62° 00′ E 520 feet;

thence N 23° 10′ E 270 feet; thence S 67° 05′ E 245 feet more or less to point on W bank of M. & E. Canal; thence southerly 4200 feet more or less along W bank of M. & E. Canal to point on S line of said section; thence W 1350 feet more or less along S line of said section to place of beginning.

Section 18

The following lands in Sec. 18, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 18; thence E 700 feet along N line of said section; thence S 22° 00′ E 245 feet; thence N 87° 55′ E 190 feet; thence S 5° 30′ W 290 feet; thence S 42° 30′ E 200 feet; thence N 75° 15′ E 295 feet; thence S 37° 15′ E 165 feet; thence S 50° 00′ W 230 feet; thence S 6° 00′ E 70 feet; thence S 63° 50′ E 205 feet; thence N 63° 35′ E 130 feet; thence S 53° 50′ E 385 feet; thence S 72° 10′ E 170 feet; thence N 77° 00′ E 220 feet; thence S 26° 45′ E 125 feet; thence S 86° 45′ E 210 feet; thence S 48° 25′ E 155 feet more or less to point on E line of NW ¼ of said section; thence N 1460 feet more or less along E line of said NW ¼ to point on N line of said section; thence E 2640 feet more or less along N line of said section to NE corner thereof; thence S 5380 feet more or less along E line of said section to SE corner thereof; thence W 4240 feet along S line of said section; thence N 14° 45′ E 340 feet; thence N 52° 00′ W 120 feet; thence N 31° 10′ E 220 feet; thence N 30° 30′ W 110 feet; thence N 88° 45′ W 400 feet; thence S 23° 30′ W 225 feet; thence N 78° 00′ W 80 feet; thence N 21° 00′ E 425 feet; thence S 89° 45′ W 325 feet; thence S 33° 00′ W 70 feet; thence N 57° 00′ W 85 feet; thence N 31° 00′ W 180 feet; thence N 88° 00′ W 50 feet; thence S 3° 30′ E 175 feet; thence due W 120 feet; thence N 18° 00′ W 100 feet; thence N 38° 00′ E 155 feet; thence N 54° 20′ W 260 feet more or less tc point on W line of said section; thence N 260 feet along said W line; thence N 80° 55′ E 240 feet; thence S 33° 10′ E 260 feet; thence S 84° 15′ E 300 feet; thence S 35° 20′ E 130 feet; thence N 77° 30′ E 285 feet; thence N 39° 35′ W 190 feet; thence N 73° 00′ E 290 feet; thence N 16° 45′ E 170 feet; thence N 85° 00′ W 300 feet; thence N 41° 15′ E 315 feet; thence N 46° 35′ W 240 feet; thence N 39° 10′ W 920 feet; thence S 89° 00′ W 90 feet; thence S 22° 15′ W 505 feet; thence N 88° 00′ W 60 feet; thence N 15° 45′ W 200 feet more or less to point on W line of said section; thence N 2800 feet more or less along W line of said section to place of beginning.

Section 19

The following lands in Sec. 19, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 19, 1155 feet E of NW corner thereof; thence E 4240 feet more or less along N line of said section to NE corner thereof; thence S 5325 feet more or less along E line of said section to SE corner thereof; thence W 5330 feet more or less along S line of said section to SW corner thereof; thence N 4145 feet along W line of said section; thence N 66° 00′ E 330 feet; thence S 3° 45′ W 230 feet; thence S 43° 05′ W 180 feet; thence S 14° 30′ E 215 feet; thence S 50° 30′ E 125 feet; thence N 70° 00′ E 150 feet; thence N 48° 50′ E 230 feet; thence S 44° 30′ E 205 feet; thence S 84° 05′ E 140 feet; thence N 54° 35′ E 325 feet; thence S 62° 10′ E 275 feet; thence N 89° 10′ E 120 feet; thence N 21° 00′ E 45 feet; thence N 62° 30′ W 310 feet; thence N 35° 10′ W 220 feet; thence N 34° 00′ E 140 feet;

thence S 76° 55′ E 250 feet; thence N 7° 30′ E 215 feet; thence N 40° 10′ W 205 feet; thence N 34° 45′ E 215 feet; thence N 8° 30′ W 135 feet; thence N 79° 00′ W 240 feet; thence N 69° 10′ E 180 feet; thence N 30° 45′ W 275 feet; thence N 1° 30′ W 100 feet; thence northwesterly 190 feet more or less to place of beginning.

Section 20

The following lands in Sec. 20, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 20; thence E 1350 feet more or less along N line of said section to point on W bank of M. & E. Canal; thence southerly 4190 feet more or less along said W bank of M. & E. Canal to point on W right-of-way line of W. O. R. R. Co.; thence southerly 1505 feet more or less along said W right-of-way line to point on S line of said section; thence W 1480 feet more or less along S line of said section to SW corner thereof; thence N 5330 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 20 where W right-of-way line of W. O. R. R. Co. in said section joins said N line; thence southerly 3930 feet more or less along said W right-of-way line to point on E bank of M. & E. Canal; thence northerly 4140 feet more or less along said E bank to point on N line of said section; thence E 1100 feet more or less along said N line of section to place of beginning.

Section 29

The following lands in Sec. 29, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 29; thence E 1490 feet more or less along N line of said section to point on W right-of-way line of W. O. R. R. Co.; thence southerly 1730 feet along said W right-of-way line; thence S 89° 00′ W 1280 feet more or less to point on W line of said section; thence N 1700 feet more or less along W line of said section to place of beginning.

Section 30

The following lands in Sec. 30, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 30; thence S 1700 feet along E line of said section; thence westerly 1345 feet more or less to corner of N line of highway, said corner being at the junction of Buxton Pike and Lockington Pike; thence westerly 3000 feet along said N line of highway; thence S 69° 00′ W 1135 feet more or less to point on W line of said section; thence N 1320 feet more or less along W line of said section to NW corner thereof; thence E 5325 feet more or less along N line of said section to place of beginning.

WASHINGTON TOWNSHIP

Such lands in T 9 N, R 5 E, 1st P. M., Washington Township, are located in Sections 1, 2, 11, 12, 13, and 24 as follows:

Section 1

The following lands in Sec. 1, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 1; thence N 310 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence easterly 1825 feet more or less along S bank of said canal to point on S line of said section; thence W 1655 feet more or less along S line of said section to place of beginning.

Section 2

The following lands in Sec. 2, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 2; thence W 4040 feet along S line of said section; thence N 1° 10′ W 250 feet; thence N 50° 30′ W 370 feet; thence S 54° 00′ W 200 feet; thence S 3° 00′ W 190 feet; thence S 54° 30′ W 315 feet more or less to point on S line of said section; thence W 100 feet along S line of said section; thence N 19° 00′ E 175 feet; thence N 1° 30′ E 340 feet; thence S 80° 30′ W 315 feet; thence N 61° 00′ W 325 feet more or less to point on W line of said section; thence N 2000 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence southeasterly 6200 feet more or less along S bank of said canal to point on E line of said section; thence S 310 feet more or less along E line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on S line of NE ¼ of Sec. 2, 2190 feet W of SE corner thereof; thence S 59° 00′ E 885 feet; thence N 82° 45′ E 125 feet; thence N 47° 15′ E 295 feet; thence S 63° 00′ E 260 feet; thence S 23° 00′ W 100 feet; thence S 71° 00′ W 310 feet; thence S 32° 00′ W 180 feet; thence S 19° 30′ E 615 feet; thence S 38° 00′ E 480 feet; thence S 46° 45′ W 235 feet more or less to point on N bank of M. & E. Canal; thence westerly 930 feet more or less along N bank of said canal to point on N and S line 1960 feet W of SE corner of said section; thence due N 660 feet more or less to point 1960 feet W and 1600 feet N of SE corner of said section; thence N 72° 30′ W 145 feet; thence N 45° 00′ W 320 feet; thence N 9° 30′ W 95 feet; thence N 41° 30′ W 155 feet; thence N 85° 30′ W 75 feet; thence N 9° 30′ W 155 feet; thence N 39° 30′ W 330 feet more or less to point on W line of E ½ of said section; thence N 400 feet along said W line of E ½ of said section; thence N 56° 00′ W 210 feet; thence N 3° 00′ W 285 feet; thence N 55° 30′ W 585 feet; thence N 46° 30′ E 155 feet; thence due E 80 feet; thence S 65° 30′ E 355 feet; thence S 40° 00′ E 485 feet; thence S 19° 45′ E 115 feet; thence S 80° 20′ E 175 feet; thence N 14° 45′ E 170 feet; thence N 28° 30′ E 220 feet; thence due E 110 feet; thence S 7° 00′ E 430 feet; thence S 46° 10′ W 170 feet; thence N 69° 40′ W 100 feet; thence S 19° 45′ W 190 feet; thence S 55° 30′ E 170 feet; thence southwesterly 75 feet more or less to place of beginning.

Section 11

The following lands in Sec. 11, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 11; thence S 1665 feet along E line of said section; thence due W 65 feet; thence N 28° 30′ W 165 feet; thence N 68° 45′ W 130 feet; thence S 66° 20′ W 325 feet; thence S 47° 50′ W 215 feet; thence N 55° 00′ W 95 feet; thence N 50° 20′ E 400 feet; thence N 13° 30′ E 215 feet; thence S 60° 20′ W 120 feet; thence S 43° 15′ W 265 feet; thence N 36° 10′ W 225 feet; thence S 26° 30′ W 450 feet; thence N 68° 30′ W 100 feet; thence N 12° 30′ E 345 feet; thence N 62° 30′ W 175 feet; thence southwesterly 180 feet more or less to the SE corner of NW ¼ of NE ¼ of said section; thence W 1350 feet more or less along S line of said NW ¼ of NE ¼ to the SW corner thereof; thence N 460 feet along W line of NE ¼ of said section; thence N 25° 00′ W 250 feet; thence S 67° 00′ W 130 feet; thence S 25° 20′ W 250 feet; thence S 89° 30′ W 65 feet; thence N 11° 00′ W 235 feet; thence N 49° 30′ E 200 feet; thence N 31° 00′ W 225 feet; thence S 75° 30′ W 140 feet; thence S 26° 30′ W 130 feet; thence S 87° 00′ W 80 feet; thence N 13° 30′ E 230 feet; thence N 21° 15′ W 170 feet; thence N 64° 00′ W 240 feet; thence S 58° 00′ W 400 feet; thence S 89° 00′ W 75 feet; thence N 1° 10′ W 310 feet more or less to point on N line of said section; thence E 4040 feet more or less along N line of said section to place of beginning.

Section 12

The following lands in Sec. 12, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 12; thence E 1710 feet more or less along N line of said section to point on W bank of M. & E. Canal; thence southeasterly 2890 feet more or less along W bank of said canal to point on N and S line 1660 feet W of NE corner of said section; thence due S 450 feet more or less to point 1660 feet W and 2160 feet S of NE corner of said section; thence S 10° 15′ E 300 feet; thence S 36° 30′ E 220 feet; thence N 63° 20′ E 100 feet; thence N 6° 00′ E 170 feet; thence N 32° 00′ E 285 feet; thence N 56° 45′ E 360 feet; thence S 87° 00′ E 120 feet; thence S 18° 30′ E 140 feet; thence S 23° 15′ W 200 feet; thence S 56° 45′ W 250 feet; thence S 12° 00′ W 280 feet more or less to point on S line of NE ¼ of said section; thence S 27° 15′ W 220 feet; thence S 13° 00′ E 155 feet; thence S 49° 30′ E 230 feet; thence N 47° 30′ E 335 feet; thence S 51° 00′ E 80 feet; thence S 26° 30′ W 325 feet; thence S 18° 30′ E 170 feet; thence S 77° 50′ E 220 feet; thence N 74° 00′ E 280 feet; thence S 34° 00′ E 100 feet; thence S 59° 30′ W 310 feet; thence S 52° 00′ E 715 feet; thence S 32° 50′ E 150 feet more or less to point on E line of said section; thence S 1135 feet more or less along E line of said section to SE corner thereof; thence W 2115 feet along S line of said section; thence N 46° 00′ E 210 feet; thence N 33° 05′ E 400 feet; thence N 40° 30′ E 230 feet; thence N 18° 00′ W 50 feet; thence S 48° 15′ W 220 feet; thence N 86° 30′ W 115 feet; thence N 12° 35′ W 200 feet; thence S 88° 00′ W 290 feet; thence N 71° 00′ W 330 feet; thence N 0° 20′ W 105 feet; thence N 75° 30′ E 260 feet; thence N 53° 30′ E 150 feet; thence S 38° 00′ E 145 feet; thence N 75° 30′ E 65 feet; thence N 16° 35′ E 170 feet; thence N 10° 00′ W 155 feet; thence N 53° 15′ W 120 feet; thence S 57° 45′ W 260 feet; thence N 68° 30′ W 85 feet; thence N 3° 50′ W 180 feet; thence N 59° 15′ W 110 feet; thence S 73° 45′ W 180 feet more or less to point on W line of SE ¼ of said

section; thence N 420 feet along said W line of SE ¼ of said section; thence S 79° 30′ W 175 feet; thence N 40° 00′ W 90 feet; thence S 67° 55′ W 445 feet; thence N 38° 15′ W 60 feet; thence N 38° 45′ E 305 feet; thence N 6° 20′ W 200 feet; thence N 28° 45′ E 215 feet; thence N 75° 30′ W 90 feet; thence S 23° 00′ W 350 feet; thence N 82° 40′ W 580 feet; thence N 18° 00′ W 70 feet; thence N 59° 00′ E 190 feet; thence N 87° 00′ W 280 feet; thence S 58° 50′ W 280 feet; thence S 20° 10′ W 215 feet; thence S 7° 20′ E 275 feet; thence S 75° 30′ W 85 feet; thence N 10° 00′ W 190 feet; thence S 40° 15′ W 180 feet; thence S 21° 30′ W 315 feet; thence N 53° 30′ W 100 feet; thence N 19° 30′ E 460 feet; thence S 65° 30′ W 505 feet; thence N 27° 50′ W 220 feet; thence N 82° 05′ E 350 feet; thence N 54° 45′ E 295 feet; thence N 25° 20′ E 150 feet; thence N 45° 00′ W 90 feet; thence N 81° 30′ W 230 feet; thence N 9° 15′ E 170 feet; thence N 63° 15′ E 360 feet; thence N 80° 15′ E 300 feet; thence N 41° 00′ E 300 feet; thence N 65° 00′ W 650 feet; thence S 59° 30′ W 590 feet; thence N 36° 45′ W 120 feet; thence N 41° 10′ E 220 feet; thence N 56° 00′ W 50 feet; thence S 51° 30′ W 195 feet; thence S 68° 45′ W 210 feet more or less to point on W line of said section; thence N 2130 feet more or less along W line of said section to place of beginning.

Section 13

The following lands in Sec. 13, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 13; thence S 1440 feet along E line of said section; thence N 60° 50′ W 185 feet; thence S 89° 00′ W 110 feet; thence N 62° 00′ W 340 feet; thence N 38° 50′ E 255 feet; thence N 54° 20′ W 100 feet; thence N 89° 00′ W 270 feet; thence N 41° 15′ W 450 feet; thence N 31° 30′ W 290 feet; thence N 3° 10′ E 310 feet more or less to point on N line of said section; thence E 1180 feet more or less along N line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 13, 1970 feet S of NE corner thereof; thence S 700 feet more or less along E line of said section to SE corner of NE ¼ thereof; thence W 575 feet along S line of NE ¼ of said section; thence N 70° 00′ W 130 feet; thence N 6° 30′ E 65 feet; thence N 75° 00′ E 280 feet; thence N 51° 40′ E 350 feet; thence N 78° 45′ W 250 feet; thence N 25° 55′ W 840 feet; thence S 79° 30′ W 215 feet; thence N 22° 30′ E 185 feet; thence N 89° 00′ E 210 feet; thence S 23° 10′ E 150 feet; thence S 45° 05′ E 700 feet; thence easterly 100 feet more or less to place of beginning.

Section 24

The following lands in Sec. 24, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 24, 1610 feet S of NE corner thereof; thence S 450 feet along E line of said section; thence S 54° 30′ W 130 feet; thence S 27° 10′ W 130 feet; thence S 68° 30′ W 215 feet; thence N 76° 05′ W 200 feet; thence N 40° 30′ W 200 feet; thence N 71° 40′ W 415 feet; thence N 44° 45′ W 210 feet; thence S 89° 30′ W 195 feet; thence N 65° 20′ W 115 feet; thence N 1° 45′ W 150 feet; thence easterly 1550 feet more or less to place of beginning.

LORAMIE TOWNSHIP

Such lands in T 9 N, R 5 E, 1st P. M., Loramie Township, are located in Sections 3, 4, 5, 7, 8, 9, 10, 17, and 18 as follows:

Section 3

The following lands in Sec. 3, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 3; thence N 1575 feet more or less along W line of said section to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence northeasterly 1770 feet along said N right-of-way line; thence S 30° 00′ E 100 feet more or less to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence northeasterly 2140 feet more or less along said S right-of-way line to point on S bank of M. & E. Canal; thence southeasterly 1770 feet more or less along S bank of M. & E. Canal to a point on E line of said section; thence S 2000 feet more or less along E line of said section to point 625 feet N of SE corner thereof; thence S 33° 10′ W 300 feet; thence N 44° 40′ W 90 feet; thence N 89° 00′ W 185 feet; thence N 49° 15′ W 230 feet; thence S 84° 30′ W 510 feet; thence N 66° 30′ W 290 feet; thence S 75° 35′ W 165 feet; thence S 16° 35′ W 185 feet; thence S 3° 20′ E 155 feet; thence S 46° 35′ E 90 feet; thence S 79° 10′ E 310 feet; thence N 66° 00′ E 240 feet; thence S 41° 10′ E 350 feet more or less to point on S line of said section; thence W 4470 feet more or less along S line of said section to place of beginning.

Section 4

The following lands in Sec. 4, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at the NW corner of Sec. 4; thence E 490 feet more or less along N line of said section to point on W bank of M. & E. Canal; thence southeasterly 4625 feet more or less along W and S bank of said canal to point on N and S line 1965 feet W of SE corner of said section; thence due S 700 feet more or less to point 1965 feet W and 1275 feet N of SE corner of said section; thence S 42° 50′ E 300 feet; thence N 83° 00′ E 50 feet; thence N 18° 10′ E 160 feet; thence N 79° 45′ E 305 feet; thence S 1° 00′ E 160 feet; thence S 71° 40′ E 150 feet more or less to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence northeasterly 1300 feet more or less along said N right-of-way line to point on E line of said section; thence S 1575 feet more or less along E line of said section to SE corner thereof; thence W 2875 feet along S line of said section; thence N 23° 30′ E 80 feet; thence N 25° 20′ W 185 feet more or less to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence N 40° 40′ W 110 feet more or less to point on N right-of-way line of said company; thence N 1° 35′ W 345 feet; thence N 19° 20′ W 150 feet; thence N 44° 30′ W 330 feet; thence N 66° 00′ W 260 feet; thence N 40° 20′ W 365 feet; thence N 29° 15′ W 235 feet; thence S 89° 10′ W 175 feet; thence S 58° 25′ W 120 feet; thence S 78° 35′ W 190 feet; thence N 52° 10′ W 130 feet; thence N 61° 00′ E 380 feet; thence N 0° 30′ W 85 feet; thence N 43° 50′ W 125 feet; thence N 1° 10′ W 130 feet; thence due W 100 feet; thence S 53° 45′ W 540 feet; thence N 49° 20′ W 100 feet; thence N 26° 00′ E 230 feet; thence S 62° 00′ W 640 feet; thence N 26° 20′ W 85 feet; thence N 55° 45′ E 300 feet;

thence N 23° 00′ E 100 feet; thence S 69° 40′ W 220 feet; thence N 52° 35′ W 170 feet more or less to point on W line of said section; thence N 3225 feet more or less along W line of said section to place of beginning.

Section 5

The following lands in Sec. 5, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 5; thence S 3220 feet along E line of said section; thence N 52° 35′ W 90 feet; thence S 85° 00′ W 310 feet; thence N 17° 40′ W 395 feet; thence N 6° 35′ E 115 feet; thence S 81° 45′ W 310 feet; thence N 11° 00′ W 85 feet more or less to point on S line of NE ¼ of said section; thence E 100 feet along S line of said NE ¼; thence N 48° 10′ E 150 feet; thence N 88° 30′ E 140 feet; thence S 79° 30′ E 150 feet; thence N 75° 30′ E 120 feet; thence N 32° 25′ E 155 feet; thence N 2° 10′ E 150 feet; thence N 71° 35′ W 600 feet; thence N 4° 45′ W 100 feet; thence N 67° 20′ E 320 feet; thence N 19° 30′ W 160 feet; thence S 84° 45′ W 720 feet; thence N 12° 45′ W 75 feet; thence N 65° 00′ E 500 feet; thence N 8° 30′ W 150 feet; thence N 81° 30′ W 350 feet; thence N 9° 25′ W 190 feet; thence N 86° 00′ W 130 feet; thence N 9° 00′ W 110 feet; thence S 85° 00′ E 345 feet; thence N 6° 45′ W 225 feet; thence N 44° 30′ W 190 feet; thence S 82° 00′ W 145 feet; thence N 31° 45′ W 90 feet; thence N 60° 00′ E 215 feet; thence N 41° 10′ W 180 feet; thence N 89° 30′ W 170 feet; thence N 0° 30′ W 365 feet more or less to point on N line of said section; thence E 1330 feet more or less along said N line to place of beginning.

Section 7

The following lands in Sec. 7, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 7; thence W 330 feet along S line of said section; thence N 29° 00′ E 230 feet; thence N 10° 00′ W 220 feet; thence N 26° 10′ E 205 feet; thence N 3° 15′ W 270 feet; thence N 44° 35′ W 100 feet; thence S 84° 15′ W 255 feet; thence N 13° 30′ W 85 feet; thence N 70° 55′ E 530 feet more or less to point on E line of said section; thence S 1165 feet more or less along E line of said section to place of beginning.

Section 8.

The following lands in Sec. 8, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 8; thence N 1165 feet along W line of said section; thence N 53° 15′ E 360 feet; thence S 44° 10′ E 355 feet; thence N 89° 45′ E 215 feet; thence N 47° 30′ E 615 feet; thence N 19° 45′ W 135 feet; thence N 48° 50′ W 310 feet; thence N 31° 45′ W 570 feet; thence S 76° 30′ E 255 feet; thence S 15° 45′ E 245 feet; thence S 57° 30′ E 460 feet; thence N 84° 00′ E 260 feet; thence N 59° 30′ E 385 feet; thence N 82° 40′ E 330 feet; thence N 10° 45′ E 600 feet more or less to point on N line of SW ¼ of said section; thence E 110 feet along N line of SW ¼ of said section; thence S 23° 50′ E 330 feet more or less to point on E line of SW ¼ of said section; thence S 59° 30′ E 220 feet; thence N 73° 30′ E 685 feet; thence S 68° 30′ E 205 feet; thence N 70° 45′ E 200 feet; thence N 14° 45′ W 80 feet; thence N 64° 10′ W 380 feet more or less to point on N line of SE ¼ of said section; thence E 440 feet along N line of SE ¼ of said section; thence S

67° 40′ E 190 feet; thence S 16° 35′ W 235 feet; thence S 70° 30′ E 200 feet; thence N 89° 15′ E 615 feet; thence N 1° 00′ W 355 feet more or less to point on N line of SE ¼ of said section; thence E 430 feet more or less along N line of SE ¼ of said section to the NE corner of said SE ¼; thence S 1670 feet along E line of said section; thence S 87° 30′ W 90 feet; thence N 46° 20′ W 185 feet; thence N 89° 00′ W 120 feet; thence S 33° 30′ W 380 feet; thence S 84° 45′ W 115 feet; thence S 54° 30′ W 440 feet; thence S 14° 15′ W 220 feet; thence S 65° 30′ W 320 feet; thence S 4° 45′ W 190 feet more or less to point on S line of said section; thence W 350 feet along S line of said section; thence N 41° 45′ E 1000 feet; thence N 56° 30′ E 430 feet; thence N 1° 00′ W 310 feet; thence S 82° 00′ W 210 feet; thence N 31° 20′ E 155 feet; thence N 40° 15′ W 110 feet; thence N 2° 20′ E 370 feet; thence N 60° 00′ W 80 feet; thence N 84° 20′ W 520 feet; thence S 59° 30′ W 210 feet; thence N 82° 30′ W 80 feet; thence N 17° 55′ E 150 feet; thence S 84° 00′ E 140 feet; thence S 33° 45′ W 435 feet; thence S 45° 00′ W 215 feet; thence S 15° 00′ W 260 feet; thence S 83° 00′ W 75 feet; thence N 25° 00′ W 185 feet; thence N 71° 10′ W 90 feet; thence S 52° 50′ W 290 feet; thence S 31° 45′ W 435 feet; thence N 65° 00′ W 250 feet; thence S 35° 30′ W 180 feet; thence S 79° 40′ W 75 feet; thence N 25° 45′ W 310 feet; thence N 89° 00′ W 70 feet; thence S 29° 30′ W 140 feet; thence S 54° 30′ W 295 feet; thence S 10° 20′ W 200 feet; thence S 22° 00′ E 290 feet; thence S 54° 30′ W 45 feet; thence N 42° 40′ W 220 feet; thence N 85° 00′ W 90 feet; thence S 48° 10′ W 240 feet; thence S 86° 10′ W 255 feet; thence N 63° 00′ W 280 feet; thence S 30° 15′ W 135 feet; thence S 63° 30′ E 165 feet; thence S 38° 50′ E 415 feet more or less to point on S line of said section; thence W 745 feet more or less along S line of said section to place of beginning.

Section 9

The following lands in Sec. 9, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 9; thence S 2635 feet more or less along E line of said section to SE corner of NE ¼ thereof; thence W 340 feet along S line of said NE ¼; thence N 41° 40′ E 285 feet; thence N 22° 00′ W 480 feet; thence S 36° 10′ W 505 feet; thence S 69° 00′ W 210 feet; thence N 50° 00′ W 60 feet; thence N 34° 40′ E 270 feet; thence N 55° 15′ W 125 feet; thence S 77° 00′ W 320 feet; thence N 62° 00′ W 1060 feet; thence S 55° 45′ W 140 feet; thence N 6° 00′ W 150 feet; thence N 45° 15′ W 260 feet; thence N 34° 40′ E 160 feet; thence N 55° 15′ E 265 feet; thence N 17° 00′ W 230 feet; thence N 76° 05′ W 260 feet more or less to point on W line of highway; thence southerly 630 feet along said W line of highway; thence S 37° 00′ W 590 feet; thence S 77° 50′ W 170 feet; thence S 33° 30′ W 80 feet; thence S 51° 00′ E 270 feet; thence S 30° 00′ W 70 feet; thence N 76° 10′ W 180 feet; thence S 44° 00′ E 160 feet; thence S 85° 00′ E 290 feet; thence S 39° 20′ E 245 feet; thence S 11° 30′ E 135 feet more or less to point on S line of N ½ of said section; thence W 880 feet along said S line of N ½ of said section; thence S 30° 30′ W 220 feet; thence S 67° 10′ W 150 feet; thence S 0° 45′ W 145 feet; thence S 26° 00′ E 110 feet; thence S 27° 55′ W 190 feet; thence S 27° 00′ E 80 feet; thence N 67° 30′ E 220 feet; thence S 27° 30′ E 100 feet more or less to point on W line of highway; thence southwesterly 145 feet more or less along W line of said highway to corner thereof; thence southwesterly 470 feet along W line of said highway; thence S 28° 30′ E 290

feet; thence S 11° 30′ E 320 feet; thence S 88° 40′ W 60 feet; thence S 62° 30′ W 350 feet; thence N 28° 00′ W 335 feet; thence N 0° 20′ E 200 feet; thence due W 210 feet; thence S 12° 50′ E 175 feet; thence S 8° 30′ W 130 feet; thence N 70° 00′ W 460 feet; thence S 49° 15′ W 400 feet more or less to point on W line of said section; thence N 1950 feet along W line of said section; thence N 36° 20′ E 500 feet; thence S 41° 20′ E 290 feet; thence due S 460 feet more or less to point on S line of highway; thence S 80° 00′ E 440 feet more or less to point on E line of highway; thence northeasterly 380 feet more or less to SE corner of Lot 11 of the Village of Houston; thence northwesterly 340 feet more or less to SW corner of Lot 7 of said Village; thence northerly 140 feet more or less to SW corner of Lot 5 of said Village; thence easterly 60 feet along S line of said Lot 5; thence S 49° 00′ E 170 feet; thence N 26° 00′ E 530 feet; thence N 65° 50′ E 520 feet; thence S 37° 30′ E 230 feet; thence N 39° 15′ E 500 feet; thence N 85° 30′ W 1025 feet; thence N 0° 30′ W 80 feet; thence N 71° 50′ E 380 feet; thence N 1° 40′ E 300 feet; thence N 87° 00′ E 70 feet; thence S 30° 40′ E 280 feet; thence N 37° 30′ E 650 feet; thence N 47° 15′ W 385 feet; thence N 87° 10′ E 490 feet; thence N 23° 30′ E 45 feet more or less to point on N line of said section; thence E 2875 feet more or less along N line of said section to place of beginning.

Section 10

The following lands in Sec. 10, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 10; thence E 3980 feet along N line of said section; thence S 80° 00′ W 600 feet; thence S 31° 45′ W 120 feet; thence S 45° 45′ W 400 feet; thence S 12° 15′ W 140 feet; thence S 40° 00′ E 220 feet; thence S 47° 30′ W 95 feet; thence N 41° 30′ W 215 feet; thence S 71° 00′ W 65 feet; thence S 36° 00′ W 140 feet; thence S 61° 00′ W 165 feet more or less to point on W line of NE ¼ of said section; thence S 80 feet along W line of said NE ¼; thence S 44° 00′ E 180 feet; thence S 3° 45′ W 150 feet; thence N 42° 00′ W 170 feet; thence N 86° 30′ W 165 feet; thence S 63° 50′ W 200 feet; thence S 49° 30′ W 450 feet; thence S 62° 00′ W 700 feet; thence S 27° 30′ W 170 feet; thence S 73° 30′ W 215 feet; thence S 8° 30′ E 125 feet; thence S 53° 45′ E 125 feet; thence N 88° 30′ E 165 feet; thence S 69° 00′ E 195 feet; thence S 42° 20′ E 185 feet; thence N 68° 10′ E 275 feet; thence S 39° 00′ E 50 feet; thence S 54° 20′ W 495 feet more or less to point on S line of NW ¼ of said section; thence W 670 feet along S line of said NW ¼; thence N 9° 30′ W 260 feet; thence N 45° 40′ W 300 feet; thence S 68° 30′ W 135 feet; thence S 19° 00′ W 215 feet; thence N 20° 00′ W 270 feet; thence S 84° 30′ W 125 feet; thence S 37° 30′ W 175 feet more or less to point on W line of said section; thence N 2305 feet more or less along W line of said section to place of beginning.

Section 17

The following lands in Sec. 17, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 17; thence E 745 feet along N line of said section; thence S 49° 30′ E 190 feet; thence S 37° 00′ W 690 feet; thence S 6° 15′ E 165 feet; thence S 63° 20′ W 180 feet; thence N 68° 45′ W 350 feet more or less to point on W line of said section; thence N 800 feet more or less along W line of said section to place of beginning.

Section 18

The following lands in Sec. 18, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 18; thence S 800 feet along E line of said section; thence N 89° 10′ W 165 feet; thence N 14° 30′ W 460 feet; thence S 68° 20′ W 70 feet; thence S 31° 25′ W 670 feet; thence S 52° 55′ E 120 feet; thence S 34° 35′ W 140 feet; thence S 66° 25′ W 210 feet; thence N 69° 00′ W 275 feet; thence S 77° 35′ W 190 feet; thence N 6° 00′ E 125 feet; thence N 73° 10′ E 450 feet; thence N 15° 15′ E 290 feet; thence N 48° 15′ E 325 feet; thence N 5° 05′ E 190 feet; thence N 40° 20′ E 275 feet more or less to point on N line of said section; thence E 330 feet more or less along N line of said section to place of beginning.

TURTLE CREEK TOWNSHIP

Such lands in T 8 N, R 6 E, 1st P. M., Turtle Creek Township, are located in Sections 31 and 32 as follows:

Section 31

The following lands in Sec. 31, T 8 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 31, 865 feet W of NE corner thereof; thence S 70° 35′ W 105 feet; thence S 38° 30′ W 295 feet; thence S 86° 45′ W 145 feet; thence S 44° 00′ W 220 feet; thence S 6° 40′ W 240 feet; thence S 27° 40′ W 205 feet; thence S 0° 30′ W 310 feet; thence S 41° 05′ W 370 feet; thence S 15° 00′ W 380 feet; thence S 33° 00′ W 170 feet; thence S 7° 15′ W 380 feet; thence S 7° 50′ E 105 feet; thence S 89° 00′ E 290 feet; thence S 37° 30′ E 100 feet; thence S 22° 00′ W 405 feet; thence S 73° 00′ E 80 feet; thence N 69° 30′ E 90 feet; thence N 11° 00′ E 165 feet; thence N 89° 10′ E 260 feet; thence S 29° 00′ E 225 feet; thence S 89° 30′ E 95 feet; thence S 35° 00′ E 140 feet; thence N 87° 30′ E 285 feet; thence N 77° 50′ E 235 feet; thence S 72° 50′ E 265 feet; thence due E 325 feet more or less to point on E line of said section; thence S 440 feet along E line of said section; thence N 70° 30′ W 235 feet; thence S 45° 30′ W 340 feet; thence S 5° 15′ W 200 feet; thence S 52° 00′ W 235 feet; thence S 80° 45′ E 240 feet; thence S 50° 40′ E 370 feet; thence S 24° 15′ W 285 feet; thence S 48° 45′ W 320 feet; thence S 17° 00′ W 65 feet; thence N 86° 30′ E 295 feet; thence S 17° 30′ E 135 feet; thence S 48° 20′ W 120 feet; thence N 76° 15′ W 185 feet; thence S 40° 00′ W 70 feet; thence S 19° 50′ E 150 feet; thence S 25° 30′ W 285 feet more or less to point on S line of said section; thence W 2180 feet along S line of said section; thence N 30° 45′ W 490 feet; thence S 40° 30′ W 100 feet; thence N 71° 00′ W 80 feet; thence N 19° 50′ E 190 feet; thence N 52° 00′ W 260 feet; thence N 20° 10′ W 350 feet; thence N 78° 40′ E 195 feet; thence S 9° 10′ E 240 feet; thence S 48° 00′ E 130 feet; thence N 59° 15′ E 280 feet; thence N 15° 00′ W 135 feet; thence N 56° 45′ W 430 feet; thence S 42° 30′ W 165 feet; thence N 63° 40′ W 165 feet; thence N 22° 00′ W 105 feet; thence N 83° 15′ E 335 feet; thence N 14° 45′ E 305 feet; thence S 70° 30′ E 550 feet; thence N 2° 10′ E 120 feet; thence N 26° 00′ E 115 feet; thence N 20° 30′ E 295 feet; thence N 1° 30′ E 370 feet; thence N 43° 00′ W 360 feet more or less to point on W line of SE ¼ of said section; thence N 5° 25′ E 850 feet; thence N 12° 40′ E 290 feet; thence N 8° 00′ W 360 feet; thence N

63° 50′ E 120 feet; thence due N 245 feet; thence N 73° 10′ E 365 feet; thence N 26° 00′ E 390 feet; thence N 49° 50′ E 365 feet; thence N 36° 50′ E 390 feet; thence N 71° 30′ E 280 feet more or less to point on N line of said section; thence E 300 feet more or less along N line of said section to place of beginning.

Section 32

The following lands in Sec. 32, T 8 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 32, 3150 feet S of NW corner thereof; thence N 53° 45′ E 75 feet; thence S 72° 00′ E 160 feet; thence S 87° 30′ E 310 feet; thence N 54° 45′ E 330 feet; thence N 30° 15′ E 335 feet more or less to point on N line of SW ¼ of said section; thence E 1130 feet along N line of said SW ¼; thence S 37° 15′ E 180 feet; thence S 60° 30′ W 310 feet; thence S 84° 00′ W 145 feet; thence S 64° 30′ W 620 feet; thence S 41° 10′ W 480 feet; thence S 87° 30′ W 800 feet; thence N 42° 10′ W 180 feet more or less to point on W line of said section; thence N 380 feet more or less along W line of said section to place of beginning.

CYNTHIAN TOWNSHIP

Such lands in T 10 N, R 5 E, 1st P. M., Cynthian Township, are located in Sections 30, 31, 32, and 33 as follows:

Section 30

The following lands in Sec. 30, T 10 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 30, 2025 feet E of SW corner thereof; thence N 71° 10′ W 430 feet; thence N 44° 05′ W 645 feet; thence N 12° 25′ E 495 feet; thence N 33° 50′ W 125 feet; thence N 0° 15′ W 140 feet; thence N 74° 10′ W 435 feet; thence N 18° 45′ E 110 feet; thence S 72° 50′ E 120 feet; thence N 64° 05′ E 140 feet; thence S 60° 30′ E 160 feet; thence N 88° 20′ E 115 feet; thence N 29° 50′ E 135 feet; thence N 1° 10′ W 650 feet; thence N 70° 00′ E 195 feet; thence N 13° 00′ E 400 feet; thence N 73° 40′ W 240 feet; thence S 49° 30′ W 240 feet; thence N 49° 45′ W 435 feet; thence N 24° 45′ W 720 feet; thence N 33° 20′ E 160 feet; thence N 49° 00′ W 535 feet; thence N 65° 30′ W 220 feet; thence N 77° 50′ W 80 feet more or less to point on W line of said section; thence N 595 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence southeasterly 6890 feet more or less along S and W bank of said canal to point on S line of said section; thence W 600 feet more or less along S line of said section to place of beginning.

Section 31

The following lands in Sec. 31, T 10 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 31, 2025 feet E of NW corner thereof; thence E 600 feet more or less along N line of said section to point on W bank of M. & E. Canal; thence southeasterly 2850 feet more or less along W and S bank of said canal to point on E line of said section; thence S 790 feet more or less along E line of said section to point 1885 feet S of NE corner thereof; thence S 57° 00′ W 785 feet; thence S 61° 30′ W 530 feet more or less

to point on N line of highway; thence W 570 feet along said N line of highway; thence N 51° 45′ E 370 feet; thence N 72° 10′ E 270 feet; thence N 80° 30′ E 250 feet; thence N 44° 50′ E 175 feet; thence N 49° 00′ W 50 feet; thence S 61° 30′ W 300 feet; thence N 70° 50′ W 495 feet; thence N 53° 30′ W 295 feet; thence N 76° 10′ W 335 feet; thence S 85° 00′ W 350 feet; thence S 34° 45′ W 405 feet; thence S 59° 10′ W 260 feet; thence S 85° 30′ W 90 feet; thence S 27° 50′ W 355 feet more or less to point on S line of NW ¼ of said section; thence W 340 feet along S line of said NW ¼; thence N 28° 10′ E 280 feet; thence N 6° 30′ W 110 feet; thence N 64° 50′ E 160 feet; thence N 1° 40′ W 220 feet; thence N 51° 00′ E 490 feet; thence N 15° 45′ E 225 feet; thence N 41° 30′ E 265 feet; thence N 3° 45′ W 170 feet; thence N 40° 00′ W 90 feet; thence N 2° 30′ E 425 feet; thence N 34° 40′ W 120 feet; thence S 63° 50′ W 450 feet; thence N 36° 30′ W 170 feet; thence northeasterly 690 feet more or less to place of beginning.

Section 32

The following lands in Sec. 32, T 10 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 32; thence W 750 feet along S line of said section; thence N 17° 00′ E 200 feet; thence N 80° 00′ W 725 feet; thence N 1° 00′ W 210 feet; thence due E 315 feet; thence N 1° 00′ W 560 feet; thence N 50° 00′ W 280 feet; thence N 18° 00′ W 100 feet; thence S 89° 10′ W 220 feet; thence S 51° 50′ W 160 feet; thence S 87° 45′ W 260 feet; thence N 9° 10′ W 70 feet; thence N 72° 15′ E 185 feet; thence N 26° 00′ E 120 feet; thence N 38° 10′ W 340 feet; thence S 77° 30′ W 115 feet; thence N 19° 00′ E 260 feet; thence N 67° 00′ E 160 feet; thence N 56° 30′ W 160 feet; thence due N 100 feet; thence N 82° 25′ W 310 feet; thence S 44° 20′ W 190 feet; thence N 44° 20′ W 185 feet more or less to point on W line of SE ¼ of said section; thence N 395 feet more or less along W line of said SE ¼ to center of section; thence W 580 feet along S line of N ½ of said section; thence N 73° 00′ W 160 feet; thence N 52° 45′ W 385 feet; thence S 83° 30′ W 350 feet; thence N 20° 50′ W 240 feet; thence N 70° 30′ W 225 feet; thence S 63° 25′ W 225 feet; thence S 28° 00′ W 265 feet; thence N 70° 00′ W 65 feet; thence N 8° 10′ E 250 feet; thence N 57° 00′ E 155 feet; thence N 24° 20′ W 140 feet; thence S 84° 10′ W 300 feet; thence N 8° 30′ W 150 feet; thence N 85° 00′ W 140 feet; thence S 46° 45′ W 170 feet more or less to point on W line of said section; thence N 790 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence easterly 2140 feet more or less along S bank of said canal to point on N and S line 2070 feet E of NW corner of said section; thence due S 125 feet more or less to point 2070 feet E and 950 feet S of NW corner of said section; thence S 76° 45′ W 240 feet; thence S 3° 20′ E 170 feet; thence N 76° 45′ E 450 feet; thence S 15° 30′ E 390 feet; thence S 74° 00′ E 405 feet; thence N 49° 10′ E 110 feet; thence N 16° 30′ E 230 feet; thence N 59° 00′ E 125 feet; thence S 75° 50′ E 235 feet; thence N 0° 30′ W 325 feet; thence N 71° 05′ E 325 feet more or less to point on S bank of M. & E. Canal; thence southeasterly 3020 feet more or less along S bank of said canal to point on E line of said section; thence S 1980 feet more or less along E line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 32; thence S 1575 feet along E line of said section; thence S 26° 30′ W 375 feet; thence S 59° 30′ W 265 feet;

thence N 52° 00′ W 440 feet more or less to point on E bank of M. & E. Canal; thence northwesterly 950 feet more or less along E bank of said canal to point on W line of E ½ of NE ¼ of said section; thence N 160 feet more or less along said W line to point 810 feet S of NW corner of said E ½ of NE ¼; thence S 60° 00′ E 150 feet; thence S 42° 10′ E 510 feet: thence N 46° 00′ E 660 feet; thence N 36° 00′ W 385 feet; thence N 50° 00′ W 260 feet; thence N 2° 00′ E 260 feet; thence N 56° 20′ E 150 feet more or less to point on N line of said section; thence E 640 feet more or less along N line of said section to place of beginning.

Section 33

The following lands in Sec. 33, T 10 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 33, 340 feet S of NW corner thereof; thence S 77° 45′ E 325 feet; thence S 49° 30′ E 230 feet; thence S 67° 10′ E 465 feet; thence S 10° 20′ W 360 feet; thence N 78° 20′ W 135 feet; thence N 22° 35′ W 250 feet; thence N 83° 25′ W 270 feet; thence N 63° 00′ W 250 feet; thence S 36° 25′ W 200 feet more or less to point on W line of said section; thence N 505 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 33; thence N 1980 feet more or less along W line of said section to point on S bank of M. & E. Canal; thence southeasterly 1540 feet more or less along S bank of said canal to point on E and W line 900 feet N of SW corner of said section; thence due W 385 feet more or less to point 665 feet E and 900 feet N of SW corner of said section; thence S 82° 05′ W 80 feet; thence S 36° 45′ W 210 feet; thence S 60° 15′ W 140 feet; thence S 36° 45′ E 390 feet; thence S 19° 45′ E 365 feet more or less to point on S line of said section; thence W 700 feet more or less along S line of said section to place of beginning.

CYNTHIAN TOWNSHIP

Such lands in T 11 N, R 4 E, 1st P. M.. Cynthian Township, are located in Sections 24 and 25 as follows:

Section 24

The following lands in Sec. 24, T 11 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 24, 1930 feet W of SE corner thereof; thence N 26° 30′ W 270 feet; thence N 2° 40′ W 550 feet; thence N 43° 05′ W 200 feet; thence S 52° 30′ W 295 feet; thence N 39° 00′ W 140 feet; thence N 65° 45′ E 200 feet; thence N 23° 15′ E 205 feet; thence N 10° 40′ W 270 feet; thence N 0° 30′ W 340 feet; thence N 67° 55′ W 350 feet more or less to point on W line of SE ¼ of said section; thence N 760 feet along said W line; thence S 56° 20′ E 150 feet; thence S 6° 05′ E 315 feet; thence S 46° 45′ E 130 feet; thence N 39° 10′ E 640 feet more or less to point on N line of SE ¼ of said section; thence E 425 feet more or less along N line of said SE ¼ to point on W bank of M. & E. Canal; thence southerly 2930 feet more or less along W bank of said canal to point on S line of said section; thence W 1010 feet more or less along S line of said section to place of beginning.

Section 25

The following lands in Sec. 25, T 11 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 25, 695 feet E of NW corner of NE ¼ of said section; thence E 1010 feet more or less along N line of said section to point on S bank of M. & E. Canal; thence southeasterly 1175 feet more or less along S bank of said canal to point on E line of said section; thence S 640 feet more or less along E line of said section to point 4140 feet N of SE corner thereof; thence N 77° 35′ W 360 feet; thence S 32° 45′ W 790 feet; thence S 88° 15′ W 510 feet; thence N 42° 00′ E 525 feet more or less to point on N line of highway; thence N 13° 10′ E 560 feet; thence N 45° 10′ W 390 feet; thence N 76° 00′ W 340 feet; thence N 48° 05′ W 210 feet; thence northwesterly 615 feet more or less to place of beginning.

TAYLORSVILLE RETARDING BASIN

Lands now within the limits of The Miami Conservancy District which may be damaged or which it may be necessary for the District to take for the purposes of the District by reason of the construction of the Taylorsville Retarding Basin are located in Montgomery and Miami Counties as follows: (Refer to Sheets Nos. 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30 of Exhibit No. 5 which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located in Harrison, Butler, and Wayne Townships as follows:

HARRISON TOWNSHIP

Such lands in T 2 N, R 6 E, 1st P. M., Harrison Township, are located in Fractional Section 2 as follows:

Fractional Section 2

All lands in Frac. Sec. 2, T 2 N, R 6 E, 1st P. M., included within the right-of-way limits of the C. H. & D. Ry. Co. lying N of a line 800 feet S from and parallel with the N line of said fractional section.

BUTLER TOWNSHIP

Such lands in T 3 N, R 6 E, 1st P. M., Butler Township, are located in Fractional Sections 1, 2, 11, 13, 14, 23, 24, 26, and 35 as follows:

Fractional Section 1

All lands in Frac. Sec. 1, T 3 N, R 6 E, 1st P. M.

Fractional Section 2

The following lands in Frac. Sec. 2, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 2, 170 feet E of NW corner thereof; thence E 865 feet along N line of said fractional section; thence S 8° 10′ W 130 feet; thence S 41° 45′ E 670 feet; thence N 87° 10′ E 100 feet; thence S 56° 20′ E 70 feet; thence N 32° 10′ E 270 feet; thence S 74° 15′ E

140 feet; thence S 89° 45′ E 510 feet; thence N 44° 25′ E 160 feet; thence S 86° 45′ E 585 feet; thence N 42° 55′ E 190 feet; thence N 21° 10′ W 90 feet; thence N 72° 45′ W 260 feet; thence due N 140 feet more or less to point on N line of said fractional section; thence E 2225 feet more or less along N line of said fractional section to NE corner thereof; thence S 1280 feet more or less along E line of said fractional section to point on center line of Miami River; thence southerly 4470 feet more or less along center line of said river to point on S line of said fractional section; thence W 680 feet more or less along said S line to point 3015 feet E of SW corner of said fractional section; thence N 49° 45′ W 550 feet; thence N 39° 00′ E 300 feet; thence N 70° 25′ E 330 feet; thence N 3° 05′ E 75 feet; thence N 71° 05′ W 280 feet; thence N 14° 20′ E 140 feet; thence N 50° 20′ W 400 feet; thence N 45° 30′ E 80 feet; thence S 62° 30′ E 550 feet; thence N 55° 00′ E 145 feet; thence N 9° 10′ W 530 feet; thence N 57° 30′ W 140 feet; thence N 55° 40′ E 195 feet; thence N 57° 00′ W 210 feet; thence N 18° 45′ W 290 feet; thence S 84° 55′ W 550 feet; thence N 40° 15′ E 240 feet; thence N 69° 00′ E 430 feet; thence N 29° 05′ W 170 feet; thence N 10° 00′ W 140 feet; thence N 18° 15′ E 210 feet; thence N 62° 00′ W 190 feet; thence N 14° 40′ E 320 feet; thence N 71° 50′ W 100 feet; thence S 45° 15′ W 150 feet; thence N 74° 30′ W 340 feet; thence N 8° 30′ E 250 feet; thence N 25° 15′ E 130 feet; thence N 31° 50′ W 260 feet; thence N 64° 00′ W 170 feet; thence S 66° 20′ W 300 feet; thence N 68° 40′ W 400 feet; thence N 55° 55′ W 160 feet; thence S 71° 55′ W 150 feet; thence S 7° 50′ W 180 feet; thence S 42° 45′ W 200 feet; thence N 70° 00′ W 320 feet; thence S 53° 30′ W 75 feet; thence S 23° 55′ E 160 feet; thence S 56° 00′ W 620 feet; thence N 64° 00′ W 220 feet more or less to point on W line of said fractional section; thence N 21° 35′ E 290 feet; thence N 41° 15′ E 670 feet; thence N 65° 45′ E 320 feet; thence N 39° 20′ E 150 feet; thence N 27° 00′ W 370 feet; thence N 79° 15′ W 400 feet; thence N 54° 20′ W 360 feet; thence northeasterly 130 feet more or less to place of beginning.

Fractional Section 11

The following lands in Frac. Sec. 11, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 11, 3015 feet E of the NW corner thereof; thence E 680 feet more or less along N line of said fractional section to point on center line of Miami River; thence S 5400 feet more or less along center line of Miami River to point on S line of said fractional section; thence W 810 feet more or less along S line of said fractional section to point 3640 feet E of SW corner thereof; thence N 11° 00′ E 100 feet; thence N 27° 40′ E 240 feet; thence N 25° 10′ W 150 feet; thence N 12° 35′ E 425 feet; thence N 14° 45′ W 110 feet; thence N 9° 00′ E 400 feet; thence N 18° 35′ W 225 feet; thence N 40° 25′ E 90 feet; thence N 17° 55′ W 1380 feet; thence N 9° 00′ W 620 feet; thence N 42° 10′ W 265 feet; thence N 38° 25′ E 210 feet; thence N 23° 50′ W 150 feet; thence N 38° 10′ W 410 feet; thence N 48° 20′ E 70 feet; thence S 89° 00′ E 310 feet; thence N 12° 30′ W 265 feet; thence N 67° 45′ W 230 feet; thence N 5° 30′ W 60 feet; thence N 34° 20′ E 270 feet; thence northwesterly 300 feet more or less to place of beginning.

Fractional Section 13

All lands in Frac. Sec. 13, T 3 N, R 6 E, 1st P. M.

Fractional Section 14

The following lands in Frac. Sec. 14, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 14, 3835 feet E of NW corner thereof; thence E 810 feet more or less along said N line to point on center line of Miami River; thence southeasterly 950 feet more or less along center line of said river to point on E line of said fractional section; thence S 4450 feet more or less along E line of said fractional section to SE corner thereof; thence W 3370 feet along S line of said fractional section; thence N 24° 45. E 1850 feet; thence S 89° 25′ E 1090 feet; thence N 16° 30′ W 625 feet; thence N 1° 30′ E 140 feet; thence N 42° 00′ E 105 feet; thence N 2° 55′ E 175 feet; thence N 9° 15′ E 170 feet; thence N 12° 15′ W 550 feet; thence S 80° 15′ W 190 feet; thence S 68° 10′ W 215 feet; thence N 81° 30′ W 255 feet; thence N 25° 00′ E 95 feet; thence N 72° 10′ E 245 feet; thence N 37° 00′ W 155 feet; thence N 6° 40′ W 220 feet; thence S 53° 20′ W 180 feet; thence N 33° 00′ W 50 feet; thence N 23° 35′ E 240 feet; thence S 89° 20′ E 510 feet; thence N 34° 20′ E 390 feet; thence northerly 885 feet more or less to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 23; thence E 5235 feet more or less along N line of said fractional section to NE corner thereof; thence S 1000 feet more or less along E line of said fractional section to point on center line of Miami River; thence southerly 4080 feet more or less along center line of said river to point 845 feet N and 3660 feet more or less E of SW corner of said fractional section; thence northwesterly 4130 feet more or less to point on W line of said fractional section 2780 feet S of the NW corner thereof; thence N 2780 feet along said W line to place of beginning.

Fractional Section 24

All lands in Frac. Sec. 24, T 3 N, R 6 E, 1st P. M.

Fractional Section 26

All lands in Frac. Sec. 26, T 3 N, R 6 E, 1st P. M., included within the right-of-way limits of the C. H. & D. Ry. Co.

Fractional Section 35

All lands in Frac. Sec. 35, T 3 N, R 6 E, 1st P. M., included within the right-of-way limits of the C. H. & D. Ry. Co.

WAYNE TOWNSHIP

Such lands in R 8, T 2, M.R's. Wayne Township, are located in Fractional Sections 35 and 36 as follows:

Fractional Section 35

The following lands in Frac. Sec. 35, R 8, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 35, 3175 feet W of NE corner thereof; thence S 4° 25′ W 2610 feet; thence N 87° 30′ W 500 feet; thence N

33° 05′ W 1150 feet; thence N 87° 40′ W 1140 feet more or less to point on center line of Miami River; thence northerly 1830 feet more or less along said center line of Miami River to point on N line of said fractional section; thence E 1855 feet more or less along said N line to place of beginning.

Fractional Section 36

The following lands in Frac. Sec. 36, R 8, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 36, 2870 feet W of NE corner thereof; thence S 14° 30′ E 170 feet; thence S 11° 15′ W 235 feet; thence S 76° 45′ E 140 feet; thence S 3° 00′ W 25 feet; thence S 57° 30′ W 340 feet; thence S 22° 00′ E 440 feet; thence S 2° 45′ W 90 feet; thence S 83° 30′ W 370 feet; thence S 39° 15′ W 150 feet; thence S 15° 30′ W 490 feet; thence S 64° 35′ E 725 feet more or less to point on E line of W ½ of said fractional section; thence S 965 feet along said E line; thence S 33° 25′ W 960 feet; thence S 4° 25′ W 1450 feet more or less to point on S line of said fractional section; thence W 1855 feet more or less along said S line to point on center line of Miami River; thence northerly 5650 feet more or less along said center line of Miami River to point on N line of said fractional section; thence E 340 feet more or less along said N line to place of beginning.

MIAMI COUNTY

Such lands as lie in Miami County are located in Monroe, Bethel, Elizabeth, Staunton, and Concord Townships and within the corporate limits of the Municipal Corporation of Tippecanoe City as follows:

MONROE TOWNSHIP

Such lands in T 4 N, R 6 E, 1st P. M., Monroe Township, are located in Fractional Sections 10, 11, 14, 23, 24, 25, and 36, and in Sections 26 and 35 as follows:

Fractional Section 10

The following lands in Frac. Sec. 10, T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 10, 3220 feet E of the NW corner thereof; thence E 620 feet more or less along said N line to point on center line of Miami River; thence southerly along center line of said river 3250 feet more or less to point on E line of said fractional section; thence S 865 feet more or less along E line of said fractional section to point 1835 feet N of SE corner thereof; thence S 89° 00′ W 100 feet; thence N 11° 55′ W 840 feet; thence N 2° 05′ W 340 feet; thence N 44° 40′ W 1070 feet; thence N 47° 45′ W 680 feet; thence N 43° 10′ W 310 feet; thence northerly 985 feet more or less to place of beginning.

Fractional Section 11

All lands in Frac. Sec. 11, T 4 N, R 6 E, 1st P. M.

Fractional Section 14

The following lands in Frac. Sec. 14, T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 14, 310 feet E of NW corner thereof; thence E 2040 feet more or less along N line of said fractional section to point on center line of Miami River; thence southeasterly 5100 feet more or less along center line of said river to point on N line of the Municipal Corporation of Tippecanoe City; thence westerly 1340 feet along N line of said corporation; thence N 5° 10′ W 525 feet; thence N 31° 15′ E 160 feet more or less to point on E line of highway; thence northerly 215 feet along E line of highway; thence N 83° 00′ W 235 feet; thence N 53° 15′ W 140 feet; thence N 6° 40′ W 635 feet; thence N 7° 30′ E 180 feet; thence S 77° 45′ W 270 feet; thence N 9° 00′ E 345 feet; thence N 58° 30′ E 120 feet; thence N 1° 00′ E 80 feet; thence N 45° 40′ W 390 feet; thence N 3° 30′ W 65 feet; thence S 58° 50′ E 240 feet; thence N 78° 00′ E 40 feet; thence N 1° 30′ W 615 feet more or less to point on E line of highway; thence northwesterly 310 feet more or less along E line of highway to angle in said E line; thence northwesterly 1170 feet along E line of highway; thence N 72° 45′ W 205 feet; thence S 50° 20′ W 75 feet; thence S 8° 00′ W 170 feet; thence S 26° 40′ E 100 feet; thence S 29° 00′ W 100 feet; thence N 40° 45′ W 415 feet; thence N 66° 00′ E 180 feet; thence northerly 140 feet more or less to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, T 4 N, R 6 E, 1st P. M., to-wit:
All lands in the SE ¼ of SE ¼ of said fractional section.

Fractional Section 24

All lands in Frac. Sec. 24, T 4 N, R 6 E, 1st P. M.

Fractional Section 25

All lands in Frac. Sec. 25, T 4 N, R 6 E, 1st P. M.

Section 26

The following lands in Sec. 26, T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at the NE corner of Sec. 26; thence S 5225 feet more or less along E line of said section to the SE corner thereof; thence W 1490 feet more or less along S line of said section to point on W right-of-way line of C. H. & D. Ry. Co.; thence northerly 1875 feet along said W right-of-way line; thence S 87° 10′ W 485 feet; thence N 68° 00′ W 215 feet; thence S 60° 00′ W 225 feet; thence N 58° 10′ W 90 feet; thence N 41° 20′ E 250 feet; thence N 52° 30′ E 500 feet; thence N 66° 00′ E 210 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence northerly 180 feet more or less along said W right-of-way line to point on S line of highway; thence westerly 130 feet along said S line of highway; thence due N 40 feet more or less to point on N line of highway; thence westerly 810 feet along said N line of highway; thence N 1° 45′ W 100 feet; thence N 67° 35′ E 680 feet; thence N 3° 20′ W 150 feet; thence N 31° 05′ W 1655 feet; thence N 9° 45′ W 180 feet; thence S 44° 40′ E 490 feet; thence S 37° 40′ E 1010 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence N 61° 45′

E 195 feet; thence N 74° 00′ E 480 feet; thence N 33° 10′ W 585 feet; thence N 48° 55′ W 215 feet; thence N 2° 00′ E 350 feet; thence N 33° 30′ W 200 feet; thence N 14° 30′ W 285 feet more or less to point on N line of said section; thence E 2355 feet more or less along N line of said section to place of beginning.

Section 35

The following lands in Sec. 35, T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at the NE corner of Sec. 35; thence S 5375 feet more or less along E line of said section to the SE corner thereof; thence W 1985 feet along S line of said section; thence N 5° 10′ W 515 feet; thence N 61° 20′ E 160 feet; thence N 7° 45′ W 330 feet; thence N 19° 00′ E 245 feet; thence N 1° 30′ E 485 feet; thence N 15° 05′ E 270 feet; thence N 1° 50′ W 655 feet; thence N 17° 00′ E 375 feet; thence N 27° 35′ E 580 feet; thence N 7° 35′ E 700 feet; thence N 8° 05′ W 600 feet; thence N 7° 45′ E 115 feet; thence N 10° 10′ W 575 feet more or less to a point on the N line of said section; thence E 1490 feet more or less along N line of said section to place of beginning.

Fractional Section 36

All lands in Frac. Sec. 36, T 4 N, R 6 E, 1st P. M.

BETHEL TOWNSHIP

Such lands in R 9, T 1, M. R's, Bethel Township, are located in Fractional Sections 1, 2, 3, and 6 as follows:

Fractional Section 1

All lands in Frac. Sec. 1, R 9, T 1, M. R's.

Fractional Section 2

All lands in Frac. Sec. 2, R 9, T 1, M. R's.

Fractional Section 3

All lands in Frac. Sec. 3, R 9, T 1, M. R's.

Fractional Section 6

All lands in Frac. Sec. 6, R 9, T 1, M. R's.

BETHEL TOWNSHIP

Such lands in R 9, T 2, M. R's, Bethel Township, are located in Sections 17, 18, 23, 24, 29, 30, and 32, and in Fractional Sections 31, 33, 34, 35, and 36 as follows:

Section 17

The following lands in Sec. 17, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at the NW corner of Sec. 17; thence E 2780 feet along N line of said section; thence S 6° 20′ E 265 feet; thence S 45° 00′ E 215 feet; thence S 13° 25′ W 260 feet; thence S 49° 00′ E 240 feet; thence N 83° 45′ E 200 feet; thence N 42° 15′ E 250 feet; thence S 57° 00′ E 590 feet; thence S 30° 10′ E

540 feet; thence S 70° 00′ E 380 feet; thence S 27° 30′ W 370 feet; thence S 80° 00′ W 60 feet; thence N 29° 20′ W 290 feet; thence N 75° 00′ W 80 feet; thence S 1° 20′ W 185 feet; thence S 37° 45′ W 130 feet; thence N 87° 45′ W 560 feet; thence S 5° 00′ W 170 feet; thence N 43° 30′ W 230 feet; thence S 3° 00′ W 120 feet; thence S 39° 25′ W 100 feet; thence N 61° 00′ W 220 feet; thence S 85° 00′ W 270 feet; thence N 58° 40′ W 375 feet; thence S 80° 20′ W 285 feet; thence N 62° 40′ W 300 feet; thence N 8° 00′ W 215 feet; thence N 79° 30′ E 160 feet; thence N 6° 10′ W 120 feet; thence N 30° 30′ W 340 feet; thence S 77° 20′ W 90 feet; thence S 45° 35′ W 330 feet; thence N 80° 35′ W 100 feet; thence N 38° 40′ W 200 feet; thence S 61° 30′ W 40 feet; thence S 0° 30′ W 250 feet; thence S 19° 25′ W 190 feet; thence N 88° 40′ W 75 feet; thence N 4° 45′ W 400 feet; thence N 56° 00′ W 335 feet; thence S 77° 35′ W 140 feet; thence N 64° 00′ W 90 feet; thence N 3° 35′ W 125 feet; thence N 23° 15′ E 210 feet; thence S 56° 50′ W 175 feet; thence S 25° 30′ W 325 feet; thence S 0° 50′ W 220 feet; thence N 79° 30′ E 165 feet; thence S 74° 30′ E 175 feet; thence S 45° 00′ E 125 feet; thence due S 160 feet; thence N 55° 45′ W 220 feet; thence N 82° 45′ W 165 feet; thence S 85° 30′ W 305 feet; thence N 38° 00′ W 200 feet; thence N 2° 30′ W 150 feet; thence S 84° 00′ W 130 feet more or less to a point on W line of said section; thence N 1360 feet more or less along W line of said section to place of beginning.

Section 18

The following lands in Sec. 18, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 18, 55 feet S of NW corner thereof; thence S 56° 45′ E 200 feet; thence S 15° 20′ E 135 feet; thence S 35° 45′ E 140 feet; thence N 88° 15′ E 250 feet; thence S 22° 45′ E 210 feet; thence S 18° 40′ W 250 feet; thence S 40° 00′ E 75 feet; thence N 78° 10′ E 300 feet; thence S 64° 45′ E 115 feet; thence S 18° 45′ W 105 feet; thence S 34° 30′ E 255 feet; thence S 65° 20′ E 535 feet; thence S 63° 35′ E 570 feet; thence N 4° 45′ E 90 feet; thence S 86° 00′ E 70 feet; thence N 72° 15′ E 240 feet; thence S 27° 30′ E 125 feet; thence N 82° 00′ E 90 feet more or less to point on E line of NW ¼ of said section; thence N 50 feet along E line of NW ¼ of said section; thence N 65° 00′ E 480 feet; thence S 71° 10′ E 190 feet; thence S 40° 00′ E 280 feet; thence S 76° 30′ E 350 feet; thence S 1° 45′ E 115 feet; thence S 69° 30′ W 250 feet; thence S 40° 30′ W 375 feet; thence S 89° 30′ W 370 feet; thence S 21° 30′ W 300 feet; thence S 30° 00′ E 420 feet more or less to point on S line of NE ¼ of said section; thence S 53° 30′ E 295 feet; thence S 27° 00′ W 55 feet; thence N 75° 10′ W 470 feet; thence N 48° 30′ W 300 feet more or less to point on W line of said NE ¼; thence N 29° 30′ W 995 feet; thence S 88° 15′ W 280 feet; thence S 44° 45′ W 185 feet; thence S 24° 15′ E 315 feet; thence S 65° 00′ E 190 feet; thence S 49° 45′ E 305 feet; thence S 8° 45′ E 700 feet; thence S 27° 55′ E 660 feet more or less to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence southeasterly 1100 feet along S right-of-way line of said company; thence S 88° 30′ E 150 feet more or less to point on N line of said right-of-way; thence N 29° 00′ E 355 feet; thence S 78° 20′ E 445 feet; thence N 85° 15′ E 700 feet; thence N 65° 15′ E 250 feet more or less to point on E line of said section; thence S 145 feet along E line of said section; thence S 71° 50′ W 380 feet; thence S 87° 00′ W 70 feet; thence S 63° 10′ W 420 feet; thence N 63° 00′ W 245 feet; thence S 62° 50′ W 185 feet; thence N 70° 40′ W

190 feet; thence S 55° 30′ W 120 feet more or less to point on said N right-of-way line; thence S 38° 30′ W 100 feet more or less to point on S right-of-way line of said company; thence southeasterly 1370 feet more or less along said S right-of-way line to point on S line of said section; thence W 590 feet along S line of said section; thence N 47° 00′ W 360 feet; thence N 67° 45′ W 575 feet; thence N 82° 30′ W 370 feet; thence N 68° 00′ W 315 feet; thence S 27° 15′ W 140 feet; thence S 63° 30′ W 100 feet more or less to point on W line of SE ¼ of said section; thence S 315 feet more or less along W line of said SE ¼ to SW corner thereof; thence W 2735 feet more or less along S line of said section to SW corner thereof; thence N 1085 feet along W line of said section; thence S 52° 00′ E 290 feet; thence S 16° 15′ E 485 feet; thence S 46° 30′ E 200 feet; thence S 74° 15′ E 225 feet; thence S 85° 45′ E 340 feet; thence S 34° 30′ E 280 feet; thence N 40° 50′ E 180 feet; thence S 49° 55′ E 280 feet; thence S 88° 55′ E 225 feet; thence N 39° 25′ E 190 feet; thence N 15° 10′ E 205 feet; thence N 49° 40′ E 185 feet; thence N 2° 00′ E 155 feet; thence N 48° 55′ W 290 feet; thence N 74° 50′ W 285 feet; thence N 25° 10′ W 470 feet; thence N 4° 25′ E 295 feet; thence N 48° 45′ W 345 feet; thence N 4° 20′ E 265 feet; thence N 32° 25′ W 190 feet; thence N 63° 25′ W 280 feet; thence N 21° 25′ W 200 feet; thence N 84° 30′ W 195 feet; thence N 48° 45′ W 405 feet; thence S 84° 25′ W 105 feet more or less to point on W line of said section; thence N 2425 feet more or less along W line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 18, 3240 feet S of NW corner thereof; thence N 34° 15′ E 115 feet; thence S 49° 05′ E 380 feet; thence S 14° 30′ W 330 feet; thence N 89° 25′ E 165 feet; thence S 6° 35′ W 115 feet; thence S 79° 30′ W 155 feet; thence S 1° 30′ W 250 feet; thence S 83° 50′ W 350 feet more or less to point on W line of said section; thence N 910 feet more or less along W line of said section to place of beginning.

Section 23

The following lands in Sec. 23, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at the NE corner of Sec. 23; thence S 1360 feet along E line of said section; thence S 84° 30′ W 90 feet; thence N 39° 10′ W 670 feet; thence N 77° 10′ W 75 feet; thence S 69° 00′ W 375 feet; thence S 54° 00′ W 285 feet more or less to point on S line of highway; thence northwesterly 250 feet along S line of said highway; thence N 9° 05′ W 210 feet; thence N 48° 10′ W 160 feet; thence N 66° 25′ W 215 feet; thence N 14° 35′ W 60 feet; thence N 52° 00′ E 410 feet; thence N 17° 50′ W 45 feet; thence N 74° 00′ W 240 feet; thence N 19° 00′ W 190 feet; thence N 3° 40′ E 150 feet more or less to a point on N line of said section; thence E 1850 feet more or less along said N line to place of beginning.

Section 24

The following lands in Sec. 24, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 24; thence E 5315 feet more or less along N line of said section to NE corner thereof; thence S 5230 feet more or less along E line of said section to SE corner thereof; thence W 3220 feet along

S line of said section; thence N 40° 00′ W 340 feet; thence due W 430 feet; thence N 54° 30′ W 160 feet; thence N 72° 30′ W 320 feet; thence S 62° 30′ W 135 feet; thence N 43° 00′ W 345 feet; thence N 70° 00′ W 270 feet; thence N 26° 20′ W 125 feet; thence N 11° 30′ E 290 feet; thence N 36° 30′ W 385 feet more or less to point onW line of said section; thence N 3950 feet more or less along W line of said section to place of beginning.

Section 29

The following lands in Sec. 29, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at the NW corner of Sec. 29; thence E 920 feet along N line of said section; thence S 19° 30′ W 150 feet; thence S 32° 55′ W 550 feet; thence S 0° 25′ W 175 feet; thence S 12° 00′ W 500 feet; thence S 32° 30′ W 1210 feet more or less to a point on W line of said section; thence N 2360 feet more or less along W line of said section to place of beginning.

Section 30

The following lands in Sec. 30, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 30; thence E 5230 feet more or less along N line of said section to NE corner thereof; thence S 3950 feet along E line of said section; thence N 59° 35′ W 690 feet; thence S 43° 45′ W 90 feet; thence N 21° 30′ W 200 feet; thence S 82° 00′ W 85 feet; thence S 17° 00′ W 120 feet; thence N 60° 00′ W 170 feet; thence N 25° 45′ W 860 feet; thence N 87° 45′ W 340 feet; thence S 48° 10′ W 265 feet; thence S 29° 45′ W 400 feet; thence N 84° 30′ W 140 feet; thence N 9° 15′ W 795 feet; thence N 17° 50′ W 390 feet; thence N 48° 10′ W 120 feet; thence N 72° 10′ W 300 feet; thence S 43° 15′ W 95 feet; thence S 6° 30′ E 195 feet; thence S 34° 35′ E 200 feet; thence S 17° 40′ E 450 feet; thence S 37° 45′ W 180 feet; thence S 67° 30′ W 360 feet; thence S 58° 10′ W 240 feet; thence S 78° 10′ W 155 feet; thence N 84° 50′ W 210 feet; thence N 69° 40′ W 270 feet; thence N 42° 30′ W 215 feet; thence S 37° 10′ W 185 feet more or less to point on W line of highway; thence southerly 330 feet along W line of highway; thence S 29° 00′ W 420 feet; thence S 19° 10′ W 180 feet; thence S 7° 30′ E 425 feet; thence S 67° 15′ E 270 feet more or less to point on W line of highway; thence southerly 205 feet along W line of highway; thence S 42° 30′ W 300 feet; thence S 18° 30′ W 55 feet more or less to point on S line of said section; thence W 920 feet more or less along S line of said section to SW corner thereof; thence N 5280 feet more or less along W line of said section to place of beginning.

Fractional Section 31

The following lands in Frac. Sec. 31, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at the NW corner of Frac. Sec. 31; thence E 1560 feet along N line of said fractional section; thence S 18° 25′ W 160 feet; thence S 13° 55′ E 400 feet; thence S 25° 05′ E 300 feet; thence S 38° 10′ E 425 feet; thence S 4° 25′ E 530 feet; thence N 77° 00′ W 665 feet; thence S 73° 00′ W 145 feet; thence S 13° 15′ E 450 feet; thence S 64° 05′ E 225 feet; thence S 71° 05′ W 215 feet; thence S 27° 35′ E 410 feet; thence N 89° 50′ E 345 feet; thence S 40° 40′ E 100 feet; thence S 72° 25′ W 130 feet; thence S 34° 10′ W 400 feet; thence S 34° 00′ E 465 feet; thence S 87° 30′ W 250 feet; thence S 23° 00′ E

235 feet; thence S 48° 30′ E 320 feet; thence S 2° 30′ W 100 feet; thence N 77° 15′ W 190 feet; thence S 3° 05′ E 375 feet; thence S 35° 30′ E 135 feet; thence S 49° 30′ W 130 feet; thence S 1° 45′ E 320 feet; thence S 84° 25′ E 300 feet; thence S 4° 30′ W 350 feet; thence S 87° 00′ W 260 feet; thence S 14° 45′ E 200 feet more or less to point on S line of said fractional section; thence W 340 feet more or less along S line of said fractional section to point on center line of Miami River; thence northwesterly 3470 feet more or less along center line of said river to point on W line of said fractional section; thence N 2560 feet more or less along W line of said fractional section to place of beginning.

Section 32

The following lands in Sec. 32, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW. corner of Sec. 32; thence E 1350 feet along N line of said section; thence S 5° 50′ W 490 feet; thence S 33° 05′ E 370 feet; thence S 33° 15′ W 340 feet; thence S 7° 20′ W 240 feet; thence S 41° 45′ E 270 feet; thence S 7° 30′ W 700 feet; thence S 36° 30′ W 140 feet; thence S 53° 45′ E 150 feet; thence N 88° 45′ E 290 feet; thence S 21° 00′ E 300 feet; thence S 18° 30′ W 790 feet; thence S 7° 55′ E 200 feet; thence S 27° 05′ E 190 feet; thence S 60° 40′ W 365 feet; thence S 16° 15′ W 300 feet; thence S 45° 50′ E 100 feet; thence N 72° 05′ E 280 feet; thence S 76° 35′ E 350 feet; thence S 39° 10′ E 455 feet more or less to point on E line of SW ¼ of said section; thence S 78° 30′ W 490 feet; thence S 36° 30′ E 190 feet; thence N 88° 00′ E 350 feet more or less to point on E line of SW ¼ of said section; thence S 215 feet along said E line; thence S 55° 20′ W 200 feet; thence N 86° 20′ W 600 feet; thence S 62° 40′ W 250 feet more or less to point on S line of said section; thence W 1560 feet more or less along S line of said section to SW corner thereof; thence N 5330 feet more or less along W line of said section to place of beginning.

Fractional Section 33

The following lands in Frac. Sec. 33, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at point on the N line of Frac. Sec. 33, 2800 feet W of the NE corner thereof; thence S 60° 45′ E 150 feet; thence S 32° 35′ W 220 feet; thence N 71° 00′ W 320 feet; thence S 29° 10′ W 160 feet; thence S 84° 15′ E 185 feet; thence S 46° 20′ E 290 feet; thence S 1° 10′ W 100 feet; thence N 72° 25′ W 270 feet; thence S 84° 00′ W 180 feet; thence S 37° 25′ W 85 feet; thence S 5° 45′ W 320 feet; thence S 45° 00′ W 70 feet; thence S 77° 50′ E 430 feet; thence N 80° 00′ E 390 feet; thence S 61° 30′ E 260 feet; thence S 34° 30′ E 175 feet; thence S 49° 20′ W 85 feet; thence N 72° 20′ W 160 feet; thence N 51° 00′ W 110 feet; thence S 83° 20′ W 170 feet; thence S 25° 10′ W 135 feet; thence S 36° 20′ W 150 feet; thence S 4° 20′ W 85 feet; thence S 77° 55′ E 150 feet; thence S 51° 30′ E 220 feet; thence S 11° 55′ E 520 feet; thence S 57° 45′ E 220 feet; thence S 6° 30′ W 75 feet; thence N 88° 30′ W 200 feet; thence N 38° 15′ W 385 feet; thence N 19° 35′ W 190 feet; thence N 49° 30′ W 335 feet; thence S 76° 35′ W 200 feet; thence S 59° 40′ W 200 feet; thence S 64° 45′ W 130 feet; thence S 77° 45′ W 220 feet; thence N 79° 30′ W 160 feet; thence S 46° 45′ W 75 feet; thence S 16° 00′ E 230 feet; thence S 31° 45′ W 160 feet; thence S 88° 20′ E 190 feet; thence S 30° 30′ E 260 feet; thence N 89° 30′ E 60 feet; thence S 5° 05′ W 30 feet; thence N

67° 10′ E 700 feet; thence S 71° 25′ E 90 feet; thence S 43° 05′ W 150 feet; thence S 66° 25′ W 340 feet; thence S 52° 00′ W 200 feet; thence S 85° 10′ E 800 feet; thence N 78° 25′ E 130 feet; thence S 73° 40′ E 200 feet; thence S 51° 55′ E 730 feet; thence S 4° 15′ W 150 feet; thence N 60° 30′ W 700 feet; thence N 75° 00′ W 240 feet; thence S 79° 30′ W 160 feet; thence S 64° 10′ W 440 feet; thence S 88° 10′ W 300 feet; thence S 73° 50′ W 330 feet; thence N 83° 00′ W 300 feet; thence S 59° 45′ W 180 feet; thence S 2° 10′ W 165 feet; thence S 56° 15′ W 220 feet; thence S 25° 00′ W 120 feet; thence S 4° 00′ E 415 feet; thence S 24° 20′ W 430 feet; thence S 1° 25′ E 160 feet; thence S 18° 45′ E 270 feet; thence S 1° 00′ W 170 feet more or less to a point on the S line of said fractional section; thence W 1220 feet more or less along S line of said fractional section to the SW corner thereof; thence N 1525 feet more or less along W line of said fractional section to point on center line of Miami River; thence northeasterly 4575 feet more or less along center line of Miami River to point on N line of said fractional section; thence E 680 feet more or less along N line of said fractional section to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 34, 1700 feet W of the NE corner thereof; thence S 68° 10′ W 160 feet; thence S 31° 50′ W 830 feet; thence S 41° 40′ E 180 feet; thence S 20° 15′ W 70 feet; thence S 77° 35′ W 300 feet; thence S 22° 00′ W 70 feet; thence S 72° 45′ E 400 feet; thence S 36° 20′ W 460 feet; thence S 12° 10′ E 60 feet; thence due S 270 feet; thence S 16° 50′ W 290 feet; thence S 25° 30′ W 120 feet; thence S 52° 30′ E 325 feet; thence S 2° 50′ E 50 feet; thence S 81° 00′ W 300 feet; thence S 60° 35′ E 510 feet; thence S 8° 00′ E 90 feet; thence N 83° 00′ W 225 feet; thence S 81° 25′ W 200 feet; thence S 49° 00′ W 130 feet; thence S 38° 20′ E 85 feet; thence S 71° 00′ E 480 feet; thence S 41° 00′ E 350 feet; thence S 6° 05′ W 70 feet; thence N 69° 30′ W 420 feet; thence N 87° 20′ W 180 feet; thence S 79° 25′ W 160 feet; thence S 47° 40′ W 275 feet; thence S 8° 00′ W 370 feet; thence S 21° 15′ W 400 feet; thence S 37° 25′ W 225 feet; thence S 37° 00′ E 70 feet; thence N 77° 55′ E 470 feet; thence S 49° 30′ W 250 feet; thence S 22° 50′ E 120 feet; thence S 55° 00′ E 350 feet; thence S 82° 45′ E 270 feet; thence S 59° 40′ W 160 feet; thence N 81° 00′ W 540 feet; thence N 71° 00′ W 400 feet; thence S 53° 50′ W 50 feet; thence S 10° 40′ W 160 feet; thence S 60° 00′ E 210 feet more or less to a point on the S line of said fractional section; thence W 680 feet more or less along S line of said fractional section to point on center line of Miami River; thence northerly 5700 feet more or less along center line of said river to point on N line of said fractional section; thence E 780 feet more or less along N line of said fractional section to place of beginning.

Fractional Section 35

The following lands in Frac. Sec. 35, R 9, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 35; thence S 2360 feet along E line of said fractional section; thence S 32° 30′ W 460 feet; thence S 29° 25′ E 190 feet; thence S 56° 50′ W 235 feet; thence S 8° 50′ W 130 feet; thence S 44° 35′ W 140 feet; thence S 7° 05′ W 200 feet; thence S 63° 40′ W 150 feet;

thence S 15° 20' E 230 feet; thence S 80° 40' W 230 feet; thence S 13° 00' E 290 feet; thence S 33° 35' E 300 feet; thence S 9° 15' E 220 feet; thence S 34° 45' E 260 feet; thence S 17° 20' E 120 feet; thence S 41° 15' W 120 feet; thence N 23° 20' W 275 feet; thence N 49° 10' W 290 feet; thence S 84° 40' W 170 feet; thence N 71° 50' W 110 feet; thence N 89° 45' W 140 feet; thence S 45° 30' W 235 feet; thence N 89° 05' W 280 feet; thence S 34° 05' W 510 feet more or less to point on S line of said fractional section; thence W 780 feet more or less along S line of said fractional section to point on center line of Miami River; thence northerly along center line of said river 5900 feet more or less to point on N line of said fractional section; thence E 975 feet more or less along N line of said fractional section to place of beginning.

Fractional Section 36

All lands in Frac. Sec. 36, R 9, T 2, M. R's.

ELIZABETH TOWNSHIP

Such lands in R 10, T 2, M. R's, Elizabeth Township, are located in Sections 19, 25, 26, 31, 32, and 33 as follows:

Section 19

The following lands in Sec. 19, R 10, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 19; thence N 3390 feet along W line of said section; thence S 69° 15' E 950 feet; thence S 35° 05' E 140 feet; thence S 10° 15' E 345 feet; thence S 57° 10' E 285 feet; thence S 23° 40' E 540 feet; thence S 48° 15' E 200 feet; thence S 71° 20' E 420 feet; thence S 62° 30' E 205 feet; thence N 35° 15' E 595 feet; thence N 54° 45' E 160 feet; thence S 44° 10' E 240 feet; thence S 36° 50' W 230 feet; thence S 3° 30' E 460 feet; thence S 58° 40' E 670 feet; thence S 50° 00' E 200 feet; thence S 18° 50' E 130 feet; thence S 39° 10' E 585 feet; thence S 53° 30' E 280 feet; thence S 43° 50' E 400 feet; thence S 87° 30' E 285 feet; thence S 29° 15' E 265 feet more or less to point on S line of said section; thence W 5180 feet more or less along S line of said section to place of beginning.

Section 25

The following lands in Sec. 25, R 10, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 25; thence E 1585 feet along N line of said section; thence S 48° 30' E 180 feet; thence S 35° 10' E 160 feet; thence S 42° 10' E 295 feet; thence S 76° 30' E 275 feet; thence S 24° 30' E 175 feet; thence N 16° 00' E 300 feet; thence N 2° 25' W 335 feet more or less to point on N line of said section; thence E 230 feet along N line of said section; thence S 21° 30' E 260 feet; thence S 3° 30' E 115 feet; thence S 25° 20' E 240 feet; thence S 86° 30' E 150 feet; thence S 46° 05' E 330 feet; thence S 31° 50' E 390 feet; thence S 63° 00' E 140 feet; thence S 34° 45' E 270 feet; thence N 71° 55' E 90 feet; thence N 35° 15' E 180 feet; thence S 87° 30' E 120 feet; thence S 70° 10' E 400 feet more or less to point on W line of highway; thence N 73° 40' E 100 feet; thence N 14° 30' E 285 feet; thence N 12° 00' W 75 feet; thence N 35° 40' W 265 feet; thence N 6° 00' E 250 feet; thence N 80° 45' E 100 feet; thence S 29° 40' E 140 feet; thence S 44° 15' E 640

feet; thence S 4° 45′ E 245 feet; thence S 19° 30′ W 310 feet; thence S 32° 45′ W 345 feet more or less to point on N line of highway; thence easterly 130 feet along N line of highway; thence N 66° 30′ E 280 feet more or less to point on E line of said section; thence S 3600 feet more or less along E line of said section to SE corner thereof; thence W 5230 feet more or less along S line of said section to SW corner thereof; thence N 5220 feet more or less along W line of said section to place of beginning.

Section 26

The following lands in Sec. 26, R 10, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 26; thence N 1775 feet along W line of said section; thence N 89° 00′ E 370 feet; thence S 40° 30′ E 120 feet; thence S 7° 30′ E 435 feet; thence S 23° 10′ E 265 feet; thence S 44° 20′ E 835 feet; thence S 12° 45′ E 390 feet; thence S 48° 45′ E 225 feet more or less to point on S line of said section; thence W 1580 feet more or less along S line of said section to place of beginning.

Section 31

All lands in Sec. 31, R 10, T 2, M. R's.

Section 32

The following lands in Sec. 32, R 10, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 32; thence E 1930 feet along N line of said section; thence S 4° 30′ W 350 feet; thence S 58° 30′ E 220 feet; thence S 22° 00′ E 95 feet; thence S 45° 30′ W 110 feet; thence S 1° 30′ W 135 feet; thence S 58° 30′ E 80 feet; thence S 33° 45′ E 110 feet; thence S 8° 10′ W 435 feet; thence due S 120 feet; thence S 43° 10′ E 220 feet; thence S 87° 00′ E 155 feet; thence N 19° 00′ E 500 feet; thence N 57° 30′ E 55 feet more or less to point on E line of highway; thence northerly 170 feet along E line of highway; thence N 89° 00′ E 360 feet; thence S 33° 00′ E 115 feet; thence S 82° 20′ W 290 feet; thence S 2° 50′ W 160 feet; thence S 18° 10′ E 335 feet; thence N 89° 20′ E 190 feet; thence S 46° 30′ E 150 feet; thence S 9° 30′ E 220 feet; thence S 41° 20′ E 580 feet; thence S 62° 20′ E 325 feet; thence S 35° 30′ E 415 feet more or less to point on S line of NE ¼ of said section; thence S 19° 40′ E 310 feet; thence S 16° 30′ W 260 feet; thence S 28° 00′ E 150 feet; thence S 59° 50′ E 410 feet; thence S 45° 30′ E 205 feet; thence N 65° 00′ E 165 feet; thence N 88° 45′ E 150 feet more or less to point on E line of said section; thence S 1775 feet more or less along E line of said section to SE corner thereof; thence W 5270 feet more or less along S line of said section to SW corner thereof; thence N 5300 feet more or less along W line of said section to place of beginning.

Section 33

The following lands in Sec. 33, R 10, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 33; thence N 1980 feet along W line of said section; thence N 89° 00′ E 325 feet; thence S 57° 10′ E 400 feet more or less to point on W line of highway; thence southeasterly 100 feet along said W line of highway; thence S 35° 35′ E 900 feet more or less to point on

E line of W ½ of SW ¼ of said section; thence southerly 1040 feet more or less along said E line of W ½ of SW ¼ to point on S line of said section; thence W 1325 feet more or less along S line of said section to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 10, T 1, M. R's, Staunton Township, are located in Sections 2 and 3, and in Fractional Sections 1, 7, 8, 9, and 10 as follows:

Fractional Section 1

All lands in Frac. Sec. 1, R 10, T 1, M. R's.

Section 2

All lands in Sec. 2, R 10, T 1, M. R's.

Section 3

The following lands in Sec. 3, R 10, T 1, M. R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 3; thence N 4130 feet more or less along W line of said section to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence southeasterly 2390 feet more or less along said N right-of-way line to point on S line of N ½ of said section; thence E 2570 feet along said S line of N ½; thence S 6° 00′ W 125 feet; thence S 66° 30′ W 645 feet; thence S 45° 00′ W 350 feet; thence S 11° 30′ W 340 feet; thence S 23° 20′ E 390 feet; thence N 54° 10′ E 245 feet; thence N 38° 30′ E 1065 feet; thence N 65° 30′ E 255 feet; thence S 50° 15′ E 235 feet; thence S 18° 20′ E 290 feet; thence S 47° 30′ E 90 feet; thence N 89° 15′ E 125 feet more or less to point on E line of said section; thence S 1980 feet more or less along E line of said section to SE corner thereof; thence W 5270 feet more or less along S line of said section to place of beginning.

Fractional Section 7

All lands in Frac. Sec. 7, R 10, T 1, M. R's.

Fractional Section 8

All lands in Frac. Sec. 8, R 10, T 1, M. R's.

Fractional Section 9

The following lands in Frac. Sec. 9, R 10, T 1, M. R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 9; thence W 4650 feet more or less along S line of said fractional section to point on center line of Miami River; thence northerly along center line of said river 6100 feet more or less to point on N line of said fractional section; thence E 1930 feet more or less along N line of said fractional section to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence southeasterly 1820 feet more or less along N right-of-way line of said company to point on E line of said fractional section; thence S 4130 feet more or less along E line of said fractional section to place of beginning.

Fractional Section 10

The following lands in Frac. Sec. 10, R 10, T 1, M. R's, included within the lines described as follows, to-wit:

Beginning at point where S right-of-way line of C. C. C. & St. L. Ry. Co. intersects S line of Frac. Sec. 10; thence NW 1800 feet along said S right-of-way line; thence N 45° 00′ E 100 feet more or less to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence SE 1930 feet more or less along said N right-of-way line to point on S line of said fractional section; thence W 160 feet more or less along S line of said fractional section to place of beginning.

CONCORD TOWNSHIP

Such lands in T 4 N, R 6 E, 1st P. M., Concord Township, are located in Fractional Section 3, and in Section 4 as follows:

Fractional Section 3

The following lands in Frac. Sec. 3, T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 3; thence E 5020 feet more or less along N line of said fractional section to point on center line of Miami River; thence southerly along center line of said river 7500 feet more or less to point on S line of said fractional section; thence W 1135 feet more or less along S line of said fractional section to point 2715 feet E of SW corner of said fractional section; thence N 18° 00′ W 200 feet; thence N 50° 00′ W 265 feet; thence N 13° 30′ W 320 feet; thence N 46° 30′ W 490 feet; thence N 53° 30′ W 360 feet; thence N 57° 45′ W 550 feet; thence N 47° 30′ W 610 feet; thence N 24° 15′ W 275 feet; thence N 5° 30′ W 240 feet; thence N 35° 30′ W 870 feet; thence N 31° 45′ W 150 feet; thence S 88° 00′ W 80 feet more or less to point on W line of said fractional section; thence N 2145 feet more or less along W line of said fractional section to place of beginning.

Section 4

The following lands in Sec. 4. T 4 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 4; thence S 2145 feet along E line of said section; thence S 88° 10′ W 55 feet; thence N 68° 35′ W 910 feet; thence N 83° 30′ W 420 feet; thence N 56° 15′ W 625 feet; thence N 81° 50′ W 280 feet; thence N 1° 10′ W 180 feet; thence N 48° 30′ W 290 feet; thence N 79° 15′ W 325 feet more or less to point on W line of NE ¼ of said section; thence N 870 feet more or less along W line of said NE ¼ to NW corner thereof; thence E 2655 feet more or less along N line of said section to place of beginning.

CONCORD TOWNSHIP

Such lands in T 5 N, R 6 E, 1st P. M., Concord Township, are located in Section 33 and in Fractional Section 34 as follows:

Section 33

The following lands in Sec. 33, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 33; thence W 1860 feet along S line of said section; thence N 12° 30′ E 820 feet; thence N 70° 30′ E 300 feet; thence N 34° 00′ W 135 feet; thence S 76° 40′ W 295 feet; thence N 76° 20′ W 270 feet; thence N 38° 30′ W 180 feet; thence N 3° 00′ W 225 feet; thence N 53° 00′ W 140 feet; thence N 86° 00′ W 200 feet; thence N 45° 20′ W 350 feet more or less to point on W line of SE ¼ of said section; thence N 935 feet more or less along said W line of SE ¼ to center of said section; thence E 2680 feet more or less along N line of SE ¼ of said section to E ¼ corner thereof; thence S 2650 feet more or less along E line of said section to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 34; thence N 1995 feet along W line of said fractional section; thence S 89° 45′ E 1235 feet; thence N 87° 30′ E 1220 feet; thence S 74° 10′ E 1245 feet; thence due E 845 feet more or less to point on center line of Miami River; thence southerly 1710 feet more or less along said center line to point on S line of said fractional section; thence W 5020 feet more or less along said S line to place of beginning.

MUNICIPAL CORPORATION OF TIPPECANOE CITY

The following lands within the corporate limits of the Municipal Corporation of Tippecanoe City included within the lines described as follows, to-wit:

Beginning at corner of Municipal Corporation of Tippecanoe City, said corner being also SW corner of SE ¼ of SE ¼ of Sec. 23, T 4 N, R 6 E, 1st P. M.; thence W 970 feet along S line of said corporation; thence N 42° 40′ W 280 feet more or less to point on S line of street; thence N 89° 35′ E 395 feet; thence N 0° 35′ E 265 feet; thence N 5° 35′ W 400 feet; thence N 9° 10′ E 160 feet; thence S 79° 40′ E 40 feet more or less to point on E line of First Street; thence northerly 580 feet more or less along E line of First Street to SW corner of Lot 96; thence E 30 feet along S line of Lot 96; thence N 16° 55′ E 185 feet; thence N 1° 30′ E 85 feet; thence N 10° 50′ E 340 feet; thence N 7° 45′ E 400 feet more or less to point on N line of Lot 85; thence N 40° 15′ E 60 feet more or less to point on W bank of M. & E. Canal; thence northerly 1140 feet more or less along W bank of said canal to point on extended S line of Lot 6; thence W 12 feet more or less along extended S line of Lot 6 to point 200 feet E of SW corner thereof; thence N 22° 45′ W 105 feet more or less to point on S line of Plum Street; thence N 8° 30′ W 55 feet more or less to point on N line of Plum Street; thence N 19° 00′ W 180 feet; thence N 13° 00′ W 100 feet; thence N 2° 35′ E 60 feet; thence N 13° 40′ W 160 feet more or less to point on S line of Ford Avenue; thence northerly 60 feet more or less to SW corner of Lot 476; thence N 85 feet along W line of Lot 476; thence N 17° 00′ W 85 feet; thence N 2° 00′ W 75 feet; thence N 25° 20′ W 195 feet; thence N 46° 40′ W 140 feet more or less to point on S line of Lot 485; thence W 185 feet more or less along S line of Lot 485 to point on E line of Second Street; thence S 90 feet along E line of said street; thence S 89° 00′ W 65 feet more or less to point on W

line of Second Street; thence northerly 125 feet more or less to SE corner of Lot 457; thence W 320 feet more or less along N line of Union Street to point on E line of Third Street; thence S 20 feet along E line of said street; thence S 89° 00′ W 65 feet more or less to point on W line of Third Street; thence N 30 feet along W line of said street; thence N 86° 00′ W 18 feet; thence N 1° 40′ W 78 feet; thence S 84° 30′ W 135 feet; thence S 88° 15′ W 165 feet more or less to point on E line of Out Lot 65; thence S 185 feet more or less along E line of Out Lot 65 to SE corner thereof; thence W 68 feet along S line of Out Lot 65; thence N 1° 00′ W 160 feet; thence S 74° 30′ W 680 feet; thence S 84° 10′ W 100 feet; thence S 2° 50′ E 160 feet more or less to point on extended S line of Out Lot 9; thence W 390 feet more or less along said extended S line to point on extended E line of Lot 943; thence southerly 440 feet more or less to SE corner of Lot 891; thence southerly 28 feet more or less to NE corner of Lot 734; thence S 135 feet along E line of Lot 734; thence S 88° 50′ W 355 feet more or less to point on W line of Lot 732; thence N 40 feet along said W line of Lot 732; thence N 88° 30′ E 315 feet; thence N 1° 20′ W 90 feet more or less to point on N line of Lot 734; thence northeasterly 28 feet more or less to SW corner of Lot 891; thence N 485 feet along W line of Lots 891, 917, and 943, and said W line extended; thence N 88° 55′ E 380 feet; thence N 4° 25′ W 172 feet; thence N 86° 20′ E 148 feet; thence N 74° 10′ E 690 feet; thence N 1° 00′ W 12 feet; thence northeasterly 245 feet more or less to SW corner of Lot 681; thence E 150 feet more or less along S line of Lot 681 to SE corner thereof; thence N 89° 00′ E 65 feet more or less to point on E line of Third Street; thence N 1170 feet more or less along E line of Third Street to point on N corporation line of said corporation; thence E 1200 feet more or less along N corporation line to corner of said corporation; thence southerly 5745 feet more or less along E corporation line to corporation corner, said corner being also NE corner of SE ¼ of SE ¼ of said Sec. 23; thence W 1290 feet more or less along S corporation line to corporation corner; thence S 1220 feet more or less along E corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of German Street of the Municipal Corporation of Tippecanoe City with the W right-of-way line of the C. H. & D. Ry. Co.; thence southerly 390 feet along said W right-of-way line; thence S 89° 30′ W 21.75 feet; thence northerly and parallel with said W right-of-way line 390 feet more or less to point on S line of German Street; thence E 21.75 feet along said S line of German Street to place of beginning.

HUFFMAN RETARDING BASIN

Lands now within the limits of The Miami Conservancy District which may be damaged or which it may be necessary for the District to take for the purposes of the District by reason of the construction of the Huffman Retarding Basin are located in Montgomery, Greene, and Clark Counties as follows: (Refer to Sheets Nos. 31, 32, 33, 34, 35, 36, 37, and 38 of Exhibit No. 5 which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located in Mad River and Wayne Townships, and within the corporate limits of the Municipal Corporation of Dayton, as follows:

MAD RIVER TOWNSHIP

Such lands in R 7, T 2, M.R's, Mad River Township, are located in Sections 18, 23, 24, 29, and 30 as follows:

Section 18

All lands in Sec. 18, R 7, T 2, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co., and also all lands within the right-of-way limits of the O. E. Ry. Co. lying E of a line 1000 feet W from and parallel with E line of said section.

Section 23

All lands in Sec. 23, R 7, T 2, M.R's, included within the right-of-way limits of the C. C. C. & St. L. Ry. Co.

Section 24

All lands in Sec. 24, R 7, T 2 , M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

Section 29

All lands in Sec. 29, R 7, T 2, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co., excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Section 30

All lands in Sec. 30, R 7, T 2, M.R's, included within the right-of-way limits of the Nypano R. R. Co (Erie Railroad Company).

MAD RIVER TOWNSHIP

Such lands in R 8, T 2, M.R's, Mad River Township, are located in Section 13 as follows:

Section 13

The following lands in Sec. 13, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 13; thence S 3330 feet along E line of said section; thence N 38° 40′ W 2450 feet; thence northeasterly 2250 feet more or less to place of beginning.

Also the following lands in said section, to-wit:

All lands included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company).

WAYNE TOWNSHIP

Such lands in R 8, T 2, M.R's, Wayne Township, are located in Sections 4, 5, and 6 as follows:

Section 4

The following lands in Sec. 4, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 4; thence S 5300 feet more or less along E line of said section to SE corner thereof; thence W 2050 feet along S line of said section; thence N 53° 30′ W 220 feet; thence N 7° 30′ E 155 feet; thence N 40° 15′ W 375 feet; thence S 62° 15′ W 100 feet; thence N 46° 00′ W 205 feet; thence N 1° 30′ E 280 feet; thence N 28° 30′ W 160 feet; thence N 8° 30′ W 155 feet; thence N 77° 30′ W 100 feet; thence N 40° 40′ W 150 feet; thence N 81° 00′ W 160 feet; thence N 4° 30′ W 65 feet; thence N 64° 30′ E 250 feet; thence N 3° 40′ E 100 feet; thence N 89° 30′ W 100 feet; thence N 9° 00′ W 100 feet; thence N 77° 15′ W 150 feet; thence S 63° 00′ W 280 feet; thence N 64° 40′ W 570 feet; thence N 69° 45′ W 220 feet; thence N 4° 05′ E 305 feet; thence N 51° 10′ E 100 feet; thence N 60° 00′ E 310 feet; thence S 85° 50′ E 130 feet; thence N 4° 30′ E 140 feet; thence N 51° 15′ W 260 feet; thence N 32° 45′ E 80 feet; thence N 72° 50′ E 265 feet; thence N 26° 20′ E 290 feet; thence N 33° 20′ E 225 feet; thence N 29° 00′ W 375 feet; thence N 37° 50′ W 315 feet; thence N 19° 20′ W 90 feet; thence N 27° 30′ E 115 feet; thence N 40° 45′ E 125 feet; thence N 18° 30′ E 235 feet; thence N 63° 30′ W 195 feet; thence N 43° 30′ E 350 feet; thence N 28° 00′ E 90 feet; thence N 42° 10′ E 610 feet more or less to point on N line of said section; thence E 3425 feet more or less along N line of said section to place of beginning.

Section 5

The following lands in Sec. 5, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 5; thence S 5300 feet more or less along E line of said section to SE corner thereof; thence W 3425 feet along S line of said section; thence N 27° 30′ E 215 feet; thence N 33° 00′ E 800 feet; thence N 51° 50′ E 325 feet; thence N 31° 45′ E 155 feet more or less to point on E line of SW ¼ of said section; thence N 4° 00′ E 90 feet; thence N 52° 50′ W 140 feet; thence N 18° 30′ W 180 feet; thence N 39° 45′ E 345 feet more or less to point on E line of SW ¼ of said section; thence N 4° 00′ E 225 feet; thence N 85° 30′ W 150 feet; thence S 79° 30′ W 280 feet; thence N 25° 30′ W 195 feet; thence N 46° 15′ E 750 feet; thence N 2° 00′ E 200 feet; thence S 72° 00′ W 170 feet; thence N 62° 50′ W 165 feet; thence S 78° 15′ W 175 feet; thence N 3° 10′ W 290 feet; thence N 45° 45′ W 310 feet; thence N 21° 20′ E 280 feet; thence N 18° 30′ W 325 feet; thence N 73° 30′ E 80 feet; thence S 42° 30′ E 130 feet; thence N 69° 00′ E 170 feet; thence N 15° 20′ E 320 feet; thence N 77° 50′ E 240 feet; thence S 67° 15′ E 200 feet; thence S 43° 15′ E 200 feet; thence N 5° 50′ E 280 feet; thence S 63° 30′ E 170 feet; thence N 72° 30′ E 325 feet; thence N 54° 00′ E 360 feet; thence N 20° 40′ E 280 feet; thence N 14° 00′ E 300 feet more or less to point on N line of said section; thence E 1580 feet more or less along N line of said section to place of beginning.

Section 6

The following lands in Sec. 6, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 6; thence W 1580 feet along S line of said section; thence N 19° 45′ E 240 feet; thence N 39° 10′ E 150 feet; thence N 59° 30′ E 630 feet; thence N 49° 00′ E 320 feet; thence N 64° 15′ E 160 feet; thence N 80° 00′ E 160 feet; thence N 65° 00′ E 410 feet more or less to point on E line of said section; thence S 1245 feet more or less along E line of said section to place of beginning.

MUNICIPAL CORPORATION OF DAYTON

The following lands included within the corporate limits of the Municipal Corporation of Dayton, to-wit:

All lands within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) lying E of W line of Sec. 29.

Also all lands within the right-of-way limits of the C. C. C. & St. L. Ry. Co. lying E of E line of Irwin Street.

GREENE COUNTY

Such lands as lie in Greene County are located in Bath Township and within the corporate limits of the Municipal Corporations of Fairfield and Osborn as follows:

BATH TOWNSHIP

Such lands in R 7, T 2, M.R's, Bath Township, are located in Sections 6 and 12 as follows:

Section 6

The following lands in Sec. 6, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 6; thence S 625 feet along E line of said section; thence N 44° 30′ W 385 feet; thence N 85° 00′ W 85 feet; thence S 77° 25′ W 255 feet; thence S 30° 00′ W 140 feet; thence N 61° 50′ W 220 feet; thence N 4° 15′ E 130 feet; thence N 69° 30′ W 85 feet; thence N 21° 30′ W 125 feet; thence N 82° 45′ W 205 feet; thence N 60° 30′ W 255 feet; thence S 76° 40′ W 505 feet; thence S 80° 30′ W 285 feet; thence S 41° 30′ W 100 feet; thence N 41° 00′ W 290 feet; thence S 73° 30′ W 280 feet; thence S 22° 00′ W 65 feet; thence N 47° 15′ W 230 feet; thence S 82° 55′ W 165 feet; thence N 59° 30′ W 185 feet; thence N 49° 20′ W 155 feet; thence S 88° 40′ W 155 feet; thence S 29° 30′ W 75 feet; thence S 33° 40′ E 220 feet; thence S 36° 20′ W 215 feet; thence S 3° 00′ W 140 feet; thence S 29° 45′ E 145 feet; thence S 67° 10′ W 290 feet; thence N 7° 05′ W 430 feet; thence N 22° 10′ W 150 feet; thence N 48° 00′ W 230 feet; thence N 13° 30′ W 180 feet more or less to point on N line of said section; thence E 4140 feet more or less along N line of said section to place of beginning.

Section 12

The following lands in Sec. 12, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 12, 1390 feet W of NE corner thereof; thence S 59° 00′ W 2735 feet; thence northwesterly 1950 feet more or less to point where E right-of-way line of the O. E. Ry. Co. intersects the N line of said section; thence E 3400 feet more or less along N line of said section to place of beginning.

Also the following lands in said section, to-wit:

All lands in Sec. 12, included within the right-of-way limits of the C. C. C. & St. L. Ry. Co. and the O. E. Ry. Co.

BATH TOWNSHIP

Such lands in R 7, T 3, M.R's, Bath Township, are located in Section 36 as follows:

Section 36

The following lands in Sec. 36, R 7, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 36; thence E 3570 feet along N line of said section; thence S 62° 50′ E 185 feet; thence S 37° 30′ W 110 feet; thence S 62° 45′ E 325 feet; thence S 7° 00′ E 230 feet; thence S 68° 50′ E 140 feet; thence S 25° 30′ E 200 feet; thence S 69° 00′ E 210 feet more or less to point on W line of highway; thence southerly 400 feet along said W line of highway; thence N 86° 00′ W 135 feet; thence N 51° 30′ W 400 feet; thence N 78° 50′ W 265 feet; thence S 83° 30′ W 360 feet; thence N 75° 10′ W 710 feet; thence N 64° 05′ W 300 feet; thence S 87° 30′ W 340 feet; thence N 67° 15′ W 110 feet; thence S 27° 00′ W 185 feet; thence S 85° 55′ W 240 feet; thence N 24° 15′ W 110 feet; thence N 37° 40′ W 280 feet; thence S 88° 30′ W 115 feet; thence S 63° 00′ W 305 feet; thence N 83° 00′ W 390 feet; thence N 69° 15′ W 670 feet more or less to point on W line of said section; thence N 625 feet more or less along W line of said section to place of beginning.

BATH TOWNSHIP

Such lands in R 8, T 2, M.R's, Bath Township, are located in Sections 1, 2, 3, 7, and 8 as follows:

Section 1

All lands in Sec. 1, R 8, T 2, M.R's.

Section 2

The following lands in Sec. 2, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 2; thence S 5290 feet more or less along E line of said section to SE corner thereof; thence W 5305 feet more or less along S line of said section to SW corner thereof; thence N 4755 feet along W line of said section; thence N 75° 20′ E 130 feet; thence S 84° 00′ E 85 feet; thence N 71° 20′ E 265 feet; thence N 65° 00′ E 400 feet; thence N 25° 00′ E 180 feet; thence N 11° 40′ W 70 feet more or less to point on N line of said section; thence E 4455 feet more or less along N line of said section to place of beginning.

Section 3

The following lands in Sec. 3, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 3; thence S 5290 feet more or less along E line of said section to SE corner thereof; thence W 4095 feet along S line of said section; thence N 51° 50′ E 390 feet; thence N 62° 00′ E 170 feet; thence N 24° 00′ E 195 feet; thence N 8° 10′ E 230 feet; thence S 89° 30′ E 90 feet; thence S 32° 45′ E 55 feet; thence N 73° 30′ E 100 feet; thence N 44° 00′ E 155 feet; thence S 80° 10′ E 115 feet; thence N 54° 00′ E 160 feet; thence N 0° 10′ W 190 feet; thence N 63° 00′ E 85 feet; thence S 68° 50′ E 175 feet; thence N 75° 00′ E 150 feet more or less to point on E line of SW ¼ of said section; thence N 4° 45′ E 60 feet; thence N 50° 00′ W 110 feet; thence N 17° 40′ E 100 feet; thence N 89° 30′ E 170 feet; thence N 56° 10′ E 140 feet; thence N 23° 30′ E 310 feet; thence N 7° 40′ E 215 feet; thence N 30° 15′ W 110 feet; thence N 32° 30′ E 80 feet; thence S 78° 30′ E 180 feet; thence N 62° 20′ E 75 feet; thence N 7° 15′ E 80 feet; thence N 41° 00′ W 245 feet; thence S 83° 20′ E 210 feet; thence N 79° 50′ E 210 feet; thence N 5° 15′ E 190 feet; thence N 36° 45′ E 180 feet; thence N 52° 10′ E 270 feet; thence N 12° 15′ W 220 feet; thence N 32° 50′ E 160 feet; thence N 66° 15′ E 220 feet; thence N 12° 00′ E 525 feet; thence N 47° 00′ W 260 feet more or less to point on W line of highway; thence northerly 350 feet along said W line of highway; thence N 48° 35′ W 345 feet; thence N 20° 30′ W 180 feet; thence N 7° 30′ W 180 feet; thence N 87° 30′ W 105 feet; thence S 60° 30′ W 300 feet; thence N 39° 30′ W 75 feet; thence N 35° 00′ E 375 feet more or less to point on N line of said section; thence E 2050 feet more or less along N line of said section to place of beginning.

Section 7

All lands in Sec. 7, R 8, T 2, M.R's.

Section 8

The following lands in Sec. 8, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 8; thence W 5300 feet more or less along S line of said section to SW corner thereof; thence N 49° 00′ E 1640 feet; thence S 38° 00′ E 1010 feet; thence N 89° 00′ E 120 feet; thence N 19° 50′ E 415 feet; thence N 80° 00′ E 350 feet; thence N 34° 45′ E 2155 feet; thence N 26° 30′ E 220 feet; thence N 32° 35′ E 125 feet; thence N 2° 00′ E 175 feet; thence N 35° 30′ W 295 feet; thence N 72° 00′ W 170 feet; thence N 44° 30′ W 280 feet; thence N 40° 30′ E 85 feet; thence S 68° 45′ E 300 feet; thence S 89° 15′ E 195 feet; thence S 56° 10′ E 105 feet; thence N 87° 15′ E 155 feet; thence N 47° 50′ E 535 feet; thence N 57° 45′ E 410 feet; thence N 42° 10′ E 215 feet; thence N 27° 05′ W 230 feet; thence N 42° 40′ W 640 feet; thence N 60° 30′ W 290 feet; thence N 23° 45′ E 200 feet more or less to point on N line of said section; thence E 1315 feet more or less along N line of said section to NE corner thereof; thence S 5335 feet more or less along E line of said section to place of beginning.

BATH TOWNSHIP

Such lands in R 8, T 3, M.R's, Bath Township, are located in Sections 25, 26, 27, 28, 31, 32, 33, and 34 as follows:

Section 25

The following lands in Sec. 25, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 25; thence E 400 feet along N line of said section; thence S 12° 50′ E 260 feet; thence S 34° 20′ W 190 feet; thence S 63° 30′ W 290 feet; thence S 89° 00′ W 90 feet more or less to point on W line of said section; thence N 510 feet more or less along W line of said section to place of beginning.

Section 26

The following lands in Sec. 26, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 26; thence E 1810 feet more or less along N line of said section to NE corner of 29.80-acre tract owned by Ida Huston; thence southerly 410 feet more or less along E line of said tract to point on N right-of-way line of O. E. Ry. Co.; thence S 21° 05′ E 315 feet; thence S 39° 20′ E 300 feet; thence S 52° 00′ E 335 feet; thence S 60° 35′ E 2210 feet; thence S 27° 00′ W 415 feet; thence S 60° 00′ W 310 feet; thence S 2° 20′ W 95 feet; thence S 72° 45′ E 220 feet; thence N 76° 10′ E 195 feet; thence S 74° 30′ E 125 feet; thence S 4° 10′ W 280 feet; thence N 78° 30′ W 210 feet; thence S 14° 30′ W 90 feet; thence S 26° 30′ E 130 feet; thence S 21° 10′ W 255 feet; thence S 89° 45′ W 255 feet; thence S 46° 10′ W 230 feet; thence N 87° 15′ W 155 feet; thence N 76° 00′ W 345 feet; thence S 75° 55′ W 290 feet; thence N 80° 30′ W 290 feet; thence S 60° 20′ W 170 feet; thence S 35° 10′ W 200 feet; thence N 86° 55′ W 135 feet; thence N 17° 00′ W 250 feet; thence N 58° 30′ E 405 feet; thence N 26° 30′ E 110 feet; thence N 73° 30′ E 100 feet; thence N 28° 30′ W 40 feet; thence N 80° 10′ W 190 feet; thence N 48° 35′ W 315 feet; thence N 85° 45′ W 155 feet; thence S 27° 00′ W 320 feet; thence N 73° 30′ W 135 feet; thence S 56° 15′ W 450 feet; thence S 87° 55′ W 285 feet; thence N 39° 00′ W 265 feet; thence S 50° 20′ W 300 feet; thence S 0° 30′ W 150 feet; thence S 85° 30′ E 130 feet; thence N 71° 30′ E 140 feet; thence S 59° 30′ E 160 feet; thence S 50° 45′ W 260 feet; thence S 50° 10′ E 190 feet; thence S 69° 15′ E 515 feet; thence S 2° 30′ W 50 feet; thence S 38° 30′ W 140 feet; thence S 20° 30′ W 650 feet; thence S 53° 30′ W 290 feet; thence S 86° 40′ W 470 feet; thence N 60° 45′ W 110 feet; thence N 18° 50′ W 410 feet; thence S 49° 30′ W 350 feet; thence S 12° 20′ E 235 feet more or less to point on S line of said section; thence W 400 feet more or less along S line of said section to SW corner thereof; thence N 5350 feet more or less along W line of said section to place of beginning.

Section 27

The following lands in Sec. 27, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 27; thence E 5340 feet more or less along N line of said section to NE corner thereof; thence S 115 feet along E line of said section; thence S 70° 15′ W 400 feet; thence N 55° 00′ W 130 feet;

thence S 59° 50′ W 250 feet; thence S 25° 20′ W 150 feet; thence S 56° 40′ W 570 feet; thence N 84° 30′ W 260 feet; thence S 74° 10′ W 80 feet; thence S 6° 50′ E 65 feet; thence S 22° 00′ W 110 feet; thence S 82° 50′ W 175 feet; thence S 34° 10′ W 330 feet; thence S 38° 30′ W 475 feet; thence S 65° 40′ E 70 feet more or less to a point on E line of highway; thence N 53° 15′ E 740 feet; thence N 72° 05′ E 280 feet; thence S 37° 30′ E 60 feet; thence S 50° 30′ W 650 feet; thence S 4° 15′ W 140 feet; thence S 55° 15′ W 200 feet; thence S 43° 00′ E 195 feet; thence S 64° 15′ E 610 feet; thence S 6° 00′ W 200 feet; thence S 54° 10′ E 90 feet; thence N 43° 40′ E 240 feet; thence N 78° 00′ E 200 feet; thence S 18° 30′ E 320 feet; thence N 71° 50′ E 180 feet; thence S 63° 30′ E 235 feet; thence N 69° 00′ E 225 feet more or less to point on E line of said section; thence S 1230 feet more or less along E line of said section to point on N line of highway; thence westerly 1920 feet along N line of said highway; thence northwesterly 390 feet more or less to point on E corporation line of Municipal Corporation of Fairfield, which point is 192 feet S of NE corner thereof; thence northerly 192 feet along E line of said corporation to NE corner thereof; thence westerly 1275 feet more or less along N line of said corporation to NW corner thereof; thence southerly 2050 feet more or less along W line of said corporation to SW corner thereof; thence westerly 225 feet more or less along S line of 54.59-acre tract owned by Ida M. Huston to corner of said tract; thence southerly 370 feet more or less along E line of said tract to point on S line of said section; thence W 1810 feet more or less along S line of said section to SW corner thereof; thence N 5180 feet more or less along W line of said section to place of beginning.

Section 28

The following lands in Sec. 28, R 8, T 3, M.R's, to-wit:

All of the W ½ of Sec. 28, excepting those lands which lie within the corporate limits of the Municipal Corporation of Osborn.

Section 31

The following lands in Sec. 31, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 31; thence E 5365 feet more or less along N line of said section to NE corner thereof; thence S 510 feet along E line of said section; thence S 81° 30′ W 175 feet; thence N 71° 40′ W 185 feet; thence N 37° 45′ W 140 feet; thence N 4° 00′ E 110 feet; thence N 28° 10′ W 70 feet; thence N 71° 30′ W 90 feet; thence S 48° 05′ W 135 feet; thence S 22° 10′ W 80 feet; thence S 0° 10′ E 230 feet; thence N 88° 30′ W 180 feet; thence S 3° 10′ W 85 feet; thence S 34° 30′ E 135 feet; thence S 60° 30′ E 170 feet; thence N 82° 45′ E 320 feet; thence S 17° 00′ E 35 feet; thence S 73° 00′ W 350 feet; thence S 17° 00′ W 230 feet; thence S 44° 45′ E 495 feet; thence S 29° 30′ E 155 feet; thence N 75° 00′ W 220 feet; thence N 43° 30′ W 150 feet; thence N 74° 00′ W 270 feet; thence N 61° 50′ W 365 feet; thence S 47° 35′ W 300 feet more or less to point on W line of N and S highway; thence southerly 395 feet along W line of said highway; thence S 41° 00′ W 340 feet; thence S 58° 20′ W 190 feet; thence N 65° 30′ W 385 feet; thence S 3° 55′ E 285 feet; thence N 78° 20′ W 415 feet; thence S 6° 15′ W 145 feet; thence S 53° 15′ E 180 feet more or less to point on S line of NE ¼ of said section; thence E 235 feet along S line of NE ¼ of said section; thence N

60° 20′ E 120 feet; thence S 77° 35′ E 160 feet; thence N 55° 15′ E 265 feet; thence S 85° 00′ E 300 feet; thence N 57° 00′ E 375 feet; thence N 71° 30′ E 335 feet; thence S 16° 35′ W 230 feet; thence S 22° 40′ W 470 feet; thence S 14° 40′ E 395 feet; thence S 2° 45′ E 260 feet; thence N 51° 00′ W 120 feet; thence N 10° 00′ W 225 feet; thence N 43° 30′ W 80 feet; thence S 64° 30′ W 70 feet; thence S 35° 50′ W 380 feet; thence S 73° 45′ W 90 feet; thence N 4° 00′ W 60 feet; thence N 88° 45′ W 190 feet; thence S 49° 20′ W 195 feet; thence S 28° 45′ E 90 feet; thence S 50° 30′ W 165 feet; thence S 24° 20′ E 230 feet; thence S 57° 40′ W 30 feet; thence N 36° 10′ W 250 feet; thence N 77° 30′ W 70 feet; thence S 65° 20′ W 160 feet; thence S 27° 15′ W 80 feet; thence S 30° 50′ E 120 feet; thence S 86° 00′ W 245 feet; thence S 17° 00′ E 50 feet; thence S 61° 20′ E 240 feet; thence S 87° 30′ E 200 feet; thence S 0° 30′ E 75 feet; thence N 89° 10′ W 250 feet; thence N 68° 00′ W 80 feet; thence S 51° 10′ W 120 feet; thence N 84° 30′ W 130 feet; thence S 70° 40′ W 150 feet; thence S 53° 50′ E 100 feet; thence S 54° 30′ W 265 feet; thence S 39° 20′ E 200 feet; thence S 87° 45′ E 180 feet; thence S 50° 45′ E 145 feet; thence S 12° 45′ W 325 feet; thence N 63° 00′ E 465 feet; thence N 45° 30′ E 170 feet; thence S 50° 00′ E 60 feet; thence S 41° 30′ W 330 feet; thence N 81° 30′ E 125 feet; thence S 33° 45′ W 300 feet more or less to point on S line of said section; thence W 3510 feet more or less along S line of said section to SW corner thereof; thence N 5300 feet more or less along W line of said section to place of beginning.

Section 32

The following lands in Sec. 32, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 32; thence E 5350 feet more or less along N line of said section to NE corner thereof; thence S 3175 feet along E line of said section; thence S 46° 10′ W 225 feet; thence S 77° 00′ W 350 feet; thence S 45° 00′ W 165 feet; thence S 70° 40′ W 320 feet; thence S 30° 00′ W 290 feet; thence S 49° 20′ E 370 feet; thence S 33° 50′ E 105 feet; thence S 18° 00′ E 370 feet; thence S 75° 00′ E 90 feet; thence S 33° 50′ E 190 feet; thence S 11° 00′ E 245 feet; thence S 40° 45′ E 130 feet; thence N 87° 30′ E 160 feet more or less to point on E line of said section; thence S 285 feet more or less along E line of said section to SE corner thereof; thence W 5365 feet more or less along S line of said section to SW corner thereof; thence N 5320 feet more or less along W line of said section to place of beginning.

Section 33

All lands in Sec. 33, R 8, T 3, M.R's.

Section 34

All lands in Sec. 34, R 8, T 3, M.R's, excepting those lands which lie within the corporate limits of the Municipal Corporation of Osborn.

MUNICIPAL CORPORATION OF OSBORN

All lands within the corporate limits of the Municipal Corporation of Osborn.

MUNICIPAL CORPORATION OF FAIRFIELD

The following lands within the corporate limits of the Municipal Corporation of Fairfield included within the lines described as follows, to-wit:

Beginning at the NW corner of the Municipal Corporation of Fairfield; thence E 600 feet more or less along N line of said corporation to point on W line of Dayton Street; thence S 67° 40′ W 142 feet more or less to point on E line of Lot 51; thence S 50 feet more or less along E line of said lot to the SE corner thereof; thence W 70 feet along S line of Lot 51; thence S 46° 00′ W 100 feet more or less to point on W line of Lot 52; thence S 35° 35′ W 93 feet more or less to point on E line of Lot 68; thence S 120 feet more or less along W line of Third Street to SE corner of Lot 67; thence W 40 feet along S line of Lot 67; thence S 17° 20′ W 70 feet more or less to point on N line of Lot 66; thence S 8° 45′ W 275 feet more or less to point on N line of Lot 63; thence S 0° 55′ W 190 feet more or less to point on N line of Lot 61; thence S 6° 05′ W 335 feet more or less to point on N line of Lot 98; thence S 8° 45′ W 83 feet more or less to point on N line of Lot 97; thence S 14° 15′ W 85 feet more or less to point on S line of Lot 97; thence S 17° 45′ W 88 feet more or less to point on E line of Lot 85; thence S 106 feet more or less along E line of Lots 85 and 86 to SE corner of Lot 86; thence W 48 feet along S line of Lot 86; thence S 40° 35′ W 182 feet more or less to point on W line of said corporation; thence N 1744 feet more or less along W line of said corporation to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at NE corner of the Municipal Corporation of Fairfield; thence S 192 feet along E line of said corporation; thence N 53° 30′ W 135 feet more or less to point on S line of Lot 31; thence W 50 feet more or less along S line of Lot 31 to SW corner thereof; thence N 30 feet along W line of Lot 31; thence N 56° 30′ W 125 feet more or less to point on N line of Lot 30; thence N 65° 45′ W 73 feet more or less to point on N line of said corporation; thence E 340 feet more or less along N line of said corporation to place of beginning.

CLARK COUNTY

Such lands as lie in Clark County are located in Bethel and Mad River Townships as follows:

BETHEL TOWNSHIP

(See also "Bethel and Mad River Townships" for Sections 29 and 30, which lie partly in each township.)

Such lands in R 8, T 3, M.R's, Bethel Township, are located in Section 35 and 36 as follows:

Section 35

The following lands in Sec. 35, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 35; thence E 2595 feet along N line of said section; thence S 39° 45′ E 385 feet; thence N 85° 45′ W 345 feet; thence S 12° 15′ W 415 feet; thence S 69° 00′ E 390 feet; thence N 69° 05′ E 255 feet;

thence S 36° 30′ E 230 feet; thence N 56° 30′ E 530 feet; thence S 50° 30′ E 260 feet; thence S 7° 05′ E 550 feet; thence S 52° 45′ W 190 feet; thence S 36° 15′ E 195 feet; thence N 27° 05′ E 190 feet; thence N 87° 00′ E 230 feet; thence N 28° 45′ W 150 feet; thence N 6° 00′ E 185 feet; thence N 31° 10′ E 300 feet; thence N 11° 00′ W 370 feet; thence N 69° 00′ E 465 feet; thence N 76° 00′ W 980 feet more or less to point on N line of said section; thence E 1850 feet more or less along N line of said section to NE corner thereof; thence S 5330 feet more or less along E line of said section to SE corner thereof; thence W 5530 feet more or less along S line of said section to SW corner thereof; thence N 5330 feet more or less along W line of said section to place of beginning.

Section 36

The following lands in Sec. 36, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 36; thence N 2190 feet along W line of said section; thence S 87° 20′ E 105 feet; thence N 34° 50′ E 305 feet; thence S 68° 20′ E 480 feet; thence S 17° 55′ W 220 feet; thence S 22° 15′ E 115 feet; thence S 51° 30′ E 150 feet; thence S 13° 00′ W 65 feet; thence S 85° 30′ W 285 feet; thence S 46° 10′ W 190 feet; thence S 6° 00′ W 135 feet; thence S 41° 50′ E 150 feet; thence S 83° 15′ E 235 feet; thence S 2° 40′ W 315 feet; thence S 87° 10′ E 80 feet; thence N 7° 30′ E 365 feet; thence N 21° 00′ E 550 feet; thence N 0° 50′ W 440 feet; thence N 13° 20′ E 225 feet more or less to point on N line of SW ¼ of said section; thence N 85° 30′ W 75 feet; thence S 55° 30′ W 85 feet; thence N 83° 40′ W 155 feet; thence N 47° 40′ W 195 feet; thence N 41° 35′ E 95 feet; thence S 80° 30′ E 230 feet; thence N 38° 50′ E 335 feet; thence N 31° 20′ E 550 feet; thence N 34° 50′ W 140 feet; thence N 33° 30′ E 55 feet; thence S 55° 20′ E 100 feet; thence N 23° 50′ E 180 feet; thence N 2° 00′ E 335 feet; thence N 24° 40′ E 210 feet; thence N 60° 45′ E 390 feet; thence S 60° 30′ E 265 feet; thence S 1° 45′ W 310 feet; thence S 44° 45′ W 345 feet; thence S 21° 30′ W 145 feet; thence S 11° 00′ E 185 feet; thence S 19° 00′ W 390 feet; thence S 32° 20′ W 330 feet; thence S 34° 00′ E 60 feet; thence N 69° 10′ E 445 feet; thence N 51° 15′ E 585 feet; thence N 71° 50′ E 440 feet; thence N 58° 20′ E 555 feet; thence N 69° 45′ E 245 feet; thence N 49° 50′ E 280 feet; thence S 3° 25′ W 300 feet; thence S 45° 50′ W 120 feet; thence S 70° 30′ W 195 feet; thence S 84° 20′ W 150 feet; thence S 64° 40′ W 150 feet; thence S 44° 20′ W 575 feet; thence S 27° 10′ W 460 feet; thence S 31° 45′ W 540 feet; thence S 15° 45′ W 170 feet; thence S 7° 50′ E 170 feet; thence S 31° 40′ E 155 feet; thence S 16° 45′ E 485 feet; thence S 33° 15′ E 195 feet more or less to point on W line of SE ¼ of said section; thence S 1190 feet more or less along said W line of SE ¼ to SW corner thereof; thence W 2760 feet more or less along S line of said section to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 36; thence W 1850 feet more or less along S line of said section to point on S line of highway; thence northeasterly 450 feet along S line of said highway; thence N 79° 00′ E 480 feet; thence S 51° 15′ E 375 feet; thence N 34° 35′ E 1380 feet more or less to point on E line of said section; thence S 1400 feet more or less along E line of said section to place of beginning.

BETHEL AND MAD RIVER TOWNSHIPS

(See also Bethel Township and Mad River Township.)

Such lands in R 8, T 3, M.R's, Bethel and Mad River Townships, are located in Sections 29 and 30 as follows:

Section 29

The following lands in Sec. 29, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 29; thence E 5380 feet more or less along N line of said section to NE corner thereof; thence S 3140 feet along E line of said section; thence N 72° 35′ W 405 feet more or less to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence southwesterly 810 feet along S right-of-way line of said company; thence S 10° 00′ W 135 feet; thence S 63 10′ W 100 feet; thence S 7° 10′ W 275 feet; thence S 24° 15′ W 660 feet; thence S 51° 00′ W 290 feet; thence S 27° 15′ W 205 feet; thence S 7° 15′ E 140 feet; thence S 6° 50′ W 245 feet more or less to point on S line of said section; thence W 3655 feet more or less along S line of said section to SW corner thereof; thence N 5330 feet more or less along W line of said section to place of beginning.

Section 30

The following lands in Sec. 30, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 30; thence N 1470 feet along W line of said section; thence N 62° 00′ E 685 feet; thence due E 730 feet; thence S 73° 35′ E 975 feet; thence N 34° 35′ E 600 feet; thence N 70° 10′ E 640 feet; thence S 68° 05′ E 200 feet; thence S 7° 50′ W 550 feet; thence S 25° 50′ W 120 feet; thence S 16° 40′ W 165 feet; thence S 8° 20′ E 1600 feet more or less to point on S line of said section; thence W 3540 feet more or less along S line of said section to place of beginning.

MAD RIVER TOWNSHIP

(See also "Bethel and Mad River Townships" for Sections 29 and 30, which lie partly in each township.)

Such lands in R 8, T 3, M.R's, Mad River Township, are located in Sections 12, 18, 23, and 24 as follows:

Section 12

All lands in Sec. 12, R 8, T 3, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

Section 18

All lands in Sec. 18, R 8, T 3, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

Section 23

The following lands in Sec. 23, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 23; thence E 740 feet along N line of

said section; thence S 1° 45′ W 2690 feet more or less to point on S line of NW ¼ of said section; thence E 960 feet along S line of said NW ¼; thence S 35° 30′ E 120 feet; thence S 6° 45′ W 225 feet; thence N 56° 15′ E 290 feet; thence S 45° 30′ E 70 feet; thence S 24° 50′ W 270 feet; thence N 62° 00′ E 455 feet; thence S 69° 10′ E 190 feet; thence S 5° 00′ E 105 feet; thence S 43° 30′ W 240 feet; thence S 6° 00′ E 40 feet; thence S 88° 30′ E 210 feet; thence S 3° 15′ E 250 feet; thence N 85° 20′ E 115 feet more or less to point on E line of SW ¼ of said section; thence S 295 feet along said E line of SW ¼; thence S 71° 00′ W 380 feet; thence N 77° 30′ W 225 feet; thence N 57° 20′ W 530 feet; thence N 70° 00′ W 180 feet; thence S 65° 45′ W 90 feet; thence N 37° 20′ W 160 feet; thence S 84° 00′ W 260 feet; thence N 68° 30′ W 160 feet; thence N 35° 30′ W 510 feet; thence S 82° 10′ W 160 feet; thence N 80° 20′ W 480 feet more or less to point on W line of said section; thence N 3140 feet more or less along W line of said section to place of beginning.

Also the following lands in said section, to-wit:

All lands in Sec. 23 included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

Section 24

All lands in Sec. 24, R 8, T 3, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

MAD RIVER TOWNSHIP

Such lands in R 9, T 3, M.R's, Mad River Township, are located in Sections 1 and 7 as follows:

Section 1

All lands in Sec. 1, R 9, T 3, M.R's, included within the right-of-way limits of the Nypano R. R. Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co. lying W of a line 500 feet E from and parallel with W line of said section.

Section 7

All lands in Sec. 7, R 9, T 3, M.R's, included within the right-of-way limits of the Nypano R R Co. (Erie Railroad Company) and the C. C. C. & St. L. Ry. Co.

PIQUA LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Piqua and adjoining lands, are located in Miami County, as follows: (Refer to Sheets Nos. 6, 7, 8, 9, and 10 of Exhibit No. 7, which are hereby made a part of the following descriptions.)

MIAMI COUNTY

Such lands as lie in Miami County are located within the corporate limits of the Municipal Corporation of Piqua, and in Spring Creek Township as follows:

MUNICIPAL CORPORATION OF PIQUA

The following lands within the corporate limits of the Municipal Corporation of Piqua, included within the lines described as follows, to-wit:

Beginning at point on N line of Bridge Street, 150 feet E of E line of Cleveland Street; thence due S 12 feet more or less to point on corporation line of the Municipal Corporation of Piqua; thence westerly 410 feet more or less along the corporation line to corporation corner on center line of Miami River; thence southerly 1250 feet more or less along corporation line to corporation corner; thence W 242 feet more or less along corporation line to point 183 feet E of W line of Main Street; thence N 7° 00′ W 1348 feet more or less to point on N line of Bridge Street; thence N 14° 40′ W 735 feet; thence N 3° 25′ W 275 feet; thence N 17° 40′ W 240 feet; thence N 40° 45′ E 143 feet; thence N 6° 05′ E 68 feet more or less to point on S line of alley; thence northerly 230 feet more or less to SW corner of Lot 1005; thence N 162 feet more or less along W line of said lot to NW corner thereof; thence N 6°′ 40′ W 105 feet; thence N 23° 30′ W 93 feet; thence N 34° 00′ W 238 feet; thence S 85° 00′ W 55 feet; thence due N 5 feet more or less to point on S line of building; thence easterly 85 feet along said S line of building; thence N 38° 10′ W 245 feet more or less to point on W line of concrete wall on E line of Main Street; thence northerly 690 feet more or less along W line of said wall to point on S line of Union Street bridge; thence northerly 50 feet more or less to point of intersection of N line of said bridge with W line of concrete wall; thence northerly 335 feet along W line of said wall; thence N 16° 30′ E 85 feet more or less to point on E line of retaining wall N of railroad bridge; thence northerly 60 feet more or less along E line of said wall to corner thereof; thence N 32° 30′ W 25 feet more or less to point on E line of concrete wall; thence northerly 205 feet more or less along E line of said wall to corner thereof; thence E 32 feet more or less along S line of said wall to corner thereof; thence N 50 feet more or less along extended E line of said wall to point on S line of Water Street bridge; thence E 70 feet along said S line of Water Street bridge; thence S 4° 20′ E 65 feet; thence S 7° 10′ W 80 feet; thence N 56° 00′ E 165 feet; thence N 66° 00′ E 153 feet; thence N 48° 45′ E 63

feet more or less to point on N line of Water Street; thence N 79° 45′ E 120 feet more or less to point on W line of Harrison Street; thence N 83° 45′ E 320 feet more or less to point on E line of Race Street; thence N 80° 55′ E 478 feet; thence N 86° 10′ E 255 feet more or less to point on W line of Manning Street; thence S 65° 30′ E 65 feet; thence S 77° 40′ E 1035 feet; thence N 82° 50′ E 80 feet; thence N 34° 00′ E 192 feet; thence N 55° 05′ E 70 feet; thence N 38° 20′ E 155 feet; thence N 5° 30′ E 67 feet; thence N 19° 40′ W 320 feet; thence N 30° 30′ W 125 feet; thence N 39° 00′ W 238 feet; thence S 85° 00′ W 182 feet; thence S 8° 30′ W 75 feet; thence N 87° 20′ W 20 feet; thence N 1° 00′ W 90 feet; thence due W 75 feet; thence N 2° 30′ W 25 feet; thence N 81° 10′ E 75 feet; thence N 4° 05′ E 50 feet more or less to point on E line of Lot 482; thence N 130 feet along E line of Lots 482 and 489; thence N 40° 30′ W 28 feet more or less to point on S line of Green Street; thence N 4° 45′ W 60 feet; thence N 63° 00′ W 480 feet; thence N 77° 00′ W 330 feet; thence N 82° 40′ W 250 feet more or less to point on W line of Lot 4465; thence N 88° 00′ W 180 feet; thence N 80° 00′ W 140 feet; thence N 67° 10′ W 340 feet more or less to point on N line of Lot 1022; thence S 89° 10′ W 350 feet; thence N 85° 00′ W 120 feet more or less to point on N line of Lot 107; thence N 57° 45′ W 275 feet more or less to point on W line of Spring Street; thence N 25° 30′ W 20 feet; thence N 57° 45′ W 143 feet; thence S 88° 20′ W 90 feet; thence N 46° 55′ W 208 feet; thence N 51° 45′ W 576 feet; thence N 47° 10′ W 638 feet; thence N 41° 50′ W 1094 feet; thence N 18° 40′ W 150 more or less to point on an E and W line through the point of intersection of the N line of Gill Street with W line of River Street; thence N 52° 05′ W 180 feet; thence northwesterly 255 feet more or less to S corner of Lot 3220, said corner being on E line of alley; thence NW 210 feet more or less along E line of alley to point on S line of Out Lot 179; thence SW 100 feet along said S line; thence N 60° 30′ W 10 feet; thence N 40° 15′ E 125 feet; thence S 54° 00′ E 38 feet more or less to point on N line of Lot 3221; thence E 90 feet more or less along N line of said lot to NE corner thereof; thence S 42° 55′ E 527 feet; thence N 67° 50′ E 410 feet more or less to point on corporation line of said corporation; thence southerly along said corporation line to point on E bank of Miami River 220 feet more or less N and 1048 feet E of point of intersection of S line of E Main Street with E line of Staunton Street; thence S 76° 50′ W 218 feet; thence N 80° 30′ W 1070 feet; thence N 89° 30′ W 825 feet more or less to point on S line of retaining wall; thence W 285 feet more or less along S line of said wall to corner thereof; thence S 1° 25′ E 75 feet; thence S 11° 00′ W 295 feet; thence S 4° 10′ E 725 feet; thence S 19° 45′ E 295 feet; thence S 28° 40′ E 345 feet more or less to point on W line of Cleveland Street; thence S 33° 30′ E 90 feet; thence S 7° 30′ E 175 feet more or less to point on N line of Langdon Avenue; thence S 1° 20′ E 55 feet more or less to point on S line of Langdon Avenue; thence S 1° 30′ W 280 feet more or less to point on N line of Neer Avenue; thence S 9° 00′ W 225 feet; thence S 13° 40′ W 183 feet; thence S 5° 00′ W 170 feet; thence S 1° 20′ E 180 feet; thence S 11° 35′ E 185 feet; thence S 24° 50′ E 282 feet; thence easterly 70 feet more or less to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on N line of Bridge Street 1025 feet E of E line of Cleveland Street (measured along said N line); thence N 29° 00′ E 135 feet; thence N 76° 40′ E 105 feet; thence S 2° 00′ W 30 feet; thence S 70° 10′ W 75 feet; thence S 25° 50′ W 98 feet more or less to point on N line of Bridge Street; thence S 2° 00′ W 25 feet more or less to point on corporation line of said corporation; thence W 53 feet along said corporation line; thence northerly 25 feet more or less to place of beginning.

SPRING CREEK TOWNSHIP

Such lands in R 11, T 1, M.R's, Spring Creek Township, are located in Fractional Sections 29, 30, and 35 as follows:

Fractional Section 29

The following lands in Frac. Sec. 29, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 29; thence E 46 feet along N line of said fractional section; thence due S 30 feet; thence S 80° 45′ W 49 feet more or less to point on W line of said fractional section; thence N 40 feet more or less along said W line to place of beginning.

Also the following lands in said fractional section, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 29, 305 feet S of NW corner thereof; thence S 11° 40′ E 522 feet; thence S 29° 00′ E 200 feet; thence S 44° 25′ E 170 feet; thence S 64° 45′ E 175 feet; thence S 88° 50′ E 460 feet; thence N 13° 00′ E 263 feet; thence N 9° 25′ W 378 feet; thence N 2° 05′ E 500 feet more or less to point on S line of Bridge Street; thence W 15 feet along said S line of Bridge Street; thence N 2° 00′ E 25 feet more or less to point on N line of said fractional section; thence E 53 feet along said N line; thence S 2° 00′ W 25 feet more or less to point on S line of Bridge Street; thence W 12 feet along said S line of Bridge Street; thence S 2° 05′ W 440 feet; thence S 11° 15′ E 375 feet; thence S 11° 40′ W 358 feet; thence S 88° 50′ W 1000 feet; thence S 29° 25′ W 60 feet more or less to point on W line of said fractional section; thence N 998 feet more or less along W line of said fractional section to place of beginning.

Fractional Section 30

The following lands in Frac. Sec. 30, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 30, 640 feet W of point of intersection of said N line with center line of main line roadbed of C. H. & D. Ry. Co.; thence S 52° 00′ E 250 feet; thence S 76° 50′ E 290 feet more or less to point on N line of highway; thence S 54° 10′ E 205 feet; thence S 39° 30′ E 165 feet; thence S 15° 05′ E 510 feet; thence S 23° 10′ W 640 feet; thence S 28° 55′ W 313 feet; thence southwesterly 250 feet more or less to point on corporation line of Municipal Corporation of Piqua, 220 feet more or less N and 1050 feet E of point of intersection of S line of E Main Street with E line of Staunton Street; thence northwesterly 2765 feet more or less along said corporation line to point on N line of said fractional section; thence E 285 feet more or less along said N line to place of beginning.

Fractional Section 35

The following lands in Frac. Sec. 35, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 35, said corner being on the corporation line of the Municipal Corporation of Piqua; thence S 1300 feet along E line of said fractional section; thence southwesterly 130 feet more or less to corporation corner of said corporation, said corner being on center line of Miami River; thence northerly 1250 feet more or less along said corporation line to corporation corner; thence northeasterly 368 feet more or less along said corporation line to place of beginning.

SPRING CREEK TOWNSHIP

Such lands in R 12, T 1, M.R's, Spring Creek Township, are located in Fractional Sections 25 and 31 as follows:

Fractional Section 25

The following lands in Frac. Sec. 25, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 25, 4545 feet S of NW corner thereof;thence S 71° 20′ E 600 feet; thence S 59° 20′ E 925 feet; thence S 52° 00′ E 290 feet more or less to point on S line of said fractional section; thence W 290 feet more or less along said S line to point on corporation line of Municipal orporation of Piqua; thence westerly 1390 feet more or less along said corporation line to point on W line of said fractional section; thence N 495 feet more or less along said W line to place of beginning.

Fractional Section 31

The following lands in Frac. Sec. 31, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of S ½ of SE ¼ of Frac. Sec. 31, 75 feet W of W line of highway, said highway being extension of N Main Street of the Municipal Corporation of Piqua; thence S 60° 45′ E 735 feet; thence S 69° 25′ E 333 feet more or less to point on E line of Lot 8 of Assessor's Plat of 1880; thence S 74° 10′ E 405 feet more or less to point on E line of said fractional section; thence S 490 feet more or less along said E line to point on corporation line of Municipal Corporation of Piqua; thence northerly 3620 feet more or less along said corporation line to point on line bearing S 67° 40′ W from NW corner of 1.25-acre tract owned by Jno. Maroney; thence N 67° 40′ E 185 feet more or less to said corner of tract; thence southeasterly 1375 feet more or less along E bank of Miami River to point on N line of S ½ of SE ¼ of said fractional section; thence E 500 feet more or less along said N line to place of beginning.

TROY LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Troy and adjoining lands, are located in Miami County as follows: (Refer to Sheets Nos. 9, 10, 11, 12, 13, 14, 15, 16, and 17 of Exhibit No. 8, which are hereby made a part of the following descriptions.)

MIAMI COUNTY

Such lands as lie in Miami County are located within the corporate limits of the Municipal Corporation of Troy, and in Concord, and Staunton Townships as follows:

MUNICIPAL CORPORATION OF TROY

The following lands within the corporate limits of the Municipal Corporation of Troy, included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Elm Street with N corporation line; thence E 904 feet more or less along said N corporation line to corporation corner; thence southeasterly 3725 feet more or less along corporation line to corporation corner; thence northeasterly 363 feet more or less along corporation line to point on extended S line of Miami Street; thence northeasterly 31 feet along corporation line; thence S 68° 00′ E 455 feet; thence S 76° 30′ E 222 feet more or less to point on N line of Miami Street; thence S 79° 10′ E 252 feet; thence N 31° 50′ E 72 feet; thence S 62° 55′ E 246 feet more or less to point on corporation line; thence S 520 feet more or less along corporation line to corporation corner; thence easterly 1593 feet more or less along corporation line to corporation corner; thence S 1695 feet along corporation line; thence N 30° 00′ W 1088 feet more or less to point on N line of Water Street; thence NW 232 feet more or less along said N line of Water Street to SE corner of Lot 774; thence NE 88 feet along E line of Lot 774; thence N 45° 20′ W 300 feet more or less to point on N line of Lot 769; thence N 52° 35′ W 230 feet; thence N 60° 55′ W 256 feet; thence N 58° 20′ W 830 feet more or less to point on W line of Clay Street; thence NE 40 feet along said W line of Clay Street; thence N 59° 20′ W 650 feet; thence N 70° 00′ W 80 feet; thence N 81° 35′ W 142 feet; thence N 66° 40′ W 44 feet; thence N 73° 05′ W 135 feet; thence N 76° 10′ W 125 feet; thence N 65° 20′ W 70 feet; thence N 73° 10′ W 148 feet; thence N 68° 00′ W 106 feet; thence N 64° 00′ W 100 feet; thence N 59° 30′ W 182 feet; thence N 52° 45′ W 136 feet; thence N 66° 10′ W 63 feet; thence N 60° 45′ W 98 feet; thence N 36° 15′ W 55 feet; thence N 50° 30′ W 614 feet more or less to point on W line of Adams Street; thence SW 30 feet along said W line of Adams Street; thence N 51° 20′ W 196 feet; thence N 46° 05′ W 220 feet; thence N 59° 00′ W 158 feet; thence N 23° 15′ W 42 feet; thence N 46° 10′ W 218 feet; thence N 50′ 50′ W 128 feet; thence N 15° 35′ W 1192 feet; thence S 73° 20′ W 56 feet; thence S 14° 20′ E 277 feet; thence S 74° 35′ W 74 feet more or less to point on W line of Elm Street; thence N 21° 40′ W 176 feet; thence S 82° 05′ W 180 feet more or less to point on S line of Atlantic Street; thence N 15° 50′ W 60 feet more or

less to point on N line of Atlantic Street; thence N 69° 05′ E 183 feet; thence N 20° 00′ W 19 feet; thence S 89° 30′ W 365 feet; thence S 10° 10′ E 120 feet; thence N 85° 15′ E 66 feet more or less to point on N line of Atlantic Street; thence S 16° 30′ E 60 feet more or less to point on S line of Atlantic Street; thence S 61° 40′ W 70 feet; thence S 2° 25′ E 64 feet more or less to point on E line of Harrison Street; thence S 76° 20′ W 62 feet more or less to point on W line of Harrison Street; thence N 26° 30′ W 60 feet; thence N 89° 30′ W 70 feet more or less to point on S line of Atlantic Street; thence N 17° 45′ W 60 feet more or less to point on N line of Atlantic Street; thence N 64° 45′ E 72 feet; thence N 18° 45′ W 145 feet; thence S 88° 30′ W 846 feet; thence N 64° 45′ W 178 feet; thence N 25° 10′ W 70 feet more or less to point on N corporation line; thence E 1504 feet more or less along said N corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on W line of Lot 568, 35 feet from NW corner thereof, said point being on E line of N Market Street of Municipal Corporation of Troy; thence N 52° 05′ W 28 feet more or less to point on corporation line; thence NE 85 feet more or less along said corporation line to corporation corner; thence E 70 feet along said corporation line; thence S 18° 30′ W 20 feet more or less to point on N line of Lot 569; thence S 82° 10′ W 38 feet; thence southwesterly 65 feet more or less to place of beginning.

CONCORD TOWNSHIP

Such lands in T 5 N, R 6 E, 1st P. M., Concord Township, are located in Fractional Sections 16, 21, 27, and 34, as follows:

Fractional Section 16

The following lands in Frac. Sec. 16, T 5 N, R 6 E, 1st P. M., included within lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 16, 425 feet E of W line of first highway W of Miami River; thence N 22° 10′ W 252 feet; thence N 19° 35′ W 670 feet; thence N 9° 30′ W 608 feet; thence due E 180 feet more or less to point on center line of Miami River; thence southerly 1535 feet more or less along said center line to point on S line of said fractional section; thence W 180 feet more or less along said S line to place of beginning.

Fractional Section 21

The following lands in Frac. Sec. 21, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point where W line of Elm Street of Municipal Corporation of Troy intersects N line of said municipal corporation; thence W 1504 feet along N line of said municipal corporation; thence N 10° 35′ E 55 feet; thence N 89° 05′ E 986 feet; thence N 6° 35′ W 114 feet more or less to point on W line of Harrison Street; thence N 76° 40′ E 60 feet more or less to point on E line of Harrison Street; thence S 22° 30′ E 158 feet; thence N 88° 35′ E 374 feet; thence N 1° 30′ W 66 feet more or less to point on W line of Elm Street; thence N 76° 50′ E 60 feet; thence S 28° 30′ E 87 feet; thence N 89° 05′ E 455 feet; thence S 43° 30′ E 48 feet more or less to

point on N line of Municipal Corporation of Troy; thence W 560 feet more or less along N line of said municipal corporation to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 21, 425 feet E of W line of first highway W of Miami River; thence S 22° 10′ E 420 feet; thence S 8° 40′ E 865 feet; thence S 27° 40′ E 438 feet; thence S 11° 55′ E 286 feet; thence S 1° 20′ E 278 feet more or less to point on N corporation line of Municipal Corporation of Troy; thence E 145 feet more or less along said N corporation line to point on center line of Miami River; thence northerly 2274 feet more or less along center line of said river to point on N line of said fractional section; thence W 180 feet more or less along said N line to place of beginning.

Fractional Section 27

The following lands in Frac. Sec. 27, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 27, 790 feet E of center line of track of C. C. C. & St. L. Ry. Co.; thence N 20° 40′ W 210 feet; thence N 56° 25′ W 335 feet; thence N 22° 00′ E 255 feet; thence N 5° 05′ W 555 feet; thence N 19° 00′ W 75 feet; thence N 26° 25′ W 168 feet; thence N 20° 05′ W 258 feet more or less to point on S line of Springfield Road; thence N 20° 05′ W 144 feet; thence N 41° 55′ W 897 feet; thence N 40° 00′ W 645 feet; thence N 33° 05′ W 332 feet more or less to point on corporation line of Municipal Corporation of Troy; thence N 1694 feet more or less along said corporation line to point on center line of Miami River; thence easterly and southerly 9800 feet more or less along center line of said river and center line of old channel of said river to point on S line of said fractional section; thence W 765 feet more or less along said S line to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 34, 790 feet E of center line of track of C. C. C. & St. L. Ry. Co.; thence E 765 feet more or less along N line of said fractional section to point on center line of old channel of Miami River; thence southerly 857 feet more or less along said center line of old channel and center line of Miami River to point on N line of C. C. C. & St. L. Ry. bridge; thence NW 105 feet along N line of said bridge; thence N 65° 45′ W 48 feet; thence N 54° 05′ W 136 feet; thence N 20° 45′ W 270 feet; thence N 23° 15′ E 167 feet; thence northerly 175 feet more or less to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 10, T 1, M.R's, Staunton Township, are located in Fractional Sections 10, 11, 17, 23, and 24 as follows:

Fractional Section 10

The following lands in Frac. Sec. 10, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 10, 1870 feet W of W line of first N and S highway E of Miami River; thence S 3° 40′ W 340 feet; thence S 9° 20′ E 337 feet; thence S 18° 35′ E 366 feet; thence S 25° 00′ E 969 feet; thence S 36° 30′ E 238 feet; thence S 25° 40′ W 105 feet more or less to point on W line of Springfield Road; thence S 25° 40′ W 734 feet; thence S 37° 10′ W 525 feet; thence S 1° 10′ W 203 feet; thence S 11° 25′ E 160 feet; thence N 66° 10′ W 238 feet more or less to point on center line of Miami River; thence northerly 4565 feet more or less along center line of said river and center line of old channel to point on N line of said fractional section; thence E 645 feet more or less along said N line to place of beginning.

Fractional Section 11

The following lands in Frac. Sec. 11, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 11, 605 feet S of S line of first highway N of Miami River; thence N 76° 15′ E 98 feet; thence N 62° 20′ E 870 feet more or less to point on S line of highway; thence southeasterly 667 feet along S line of said highway; thence S 44° 25′ E 994 feet; thence S 25° 05′ E 509 feet; thence S 36° 05′ W 404 feet; thence S 48° 10′ W 178 feet; thence S 56° 20′ W 390 feet; thence S 63° 30′ W 607 feet; thence S 44° 00′ W 143 feet; thence S 27° 00′ W 170 feet; thence S 16° 30′ W 163 feet more or less to point on S line of said fractional section; thence W 645 feet more or less along said S line to point on center line of Miami River; thence northerly 4885 feet more or less along center line of said river to point on W line of said fractional section; thence N 265 feet more or less along said W line to place of beginning.

Fractional Section 17

The following lands in Frac. Sec. 17, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 17, 1840 feet S of NW corner thereof; thence S 50° 10′ E 333 feet; thence S 59° 30′ E 142 feet; thence S 73° 15′ E 254 feet; thence S 84° 20′ E 662 feet; thence N 33° 00′ E 276 feet; thence S 62° 20′ E 35 feet; thence S 33° 05′ W 270 feet; thence S 70° 45′ E 36 feet; thence N 33° 10′ E 150 feet; thence N 38° 35′ E 554 feet; thence N 51° 40′ W 198 feet more or less to point on S line of highway; thence N 35° 00′ E 40 feet more or less to point on N line of highway; thence S 60° 15′ E 218 feet; thence N 71° 00′ E 87 feet more or less to point on W line of highway; thence S 53° 30′ E 60 feet more or less to point on E line of highway; thence S 11° 35′ W 68 feet more or less to point on N line of highway; thence S 18° 15′ W 20 feet more or less to point on corporation line of Muncipal Corporation of Troy; thence W 71 feet more or less along said coporation line to corporation corner; thence SW 85 feet along said corporation line; thence N 51° 50′ W 30 feet more or less to point on W line of highway; thence SW 646 feet along said W line of highway; thence S 51° 30′ E 28 feet more or less to point on corporation line of Municipal Corporation of Troy; thence southwesterly 394 feet more or less along said corporation line to corporation corner; thence northwesterly 1370 feet

more or less along said corporation line to point on W line of said fractional section; thence N 295 feet more or less along said W line to place of beginning.

Also the following lands in said fractional section, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 17, 605 feet S of S line of first highway N of Miami River; thence S 265 feet more or less along E line of said fractional section to point on center line of Miami River; thence westerly 1226 feet more or less along center line of said river to point on corporation line of Municipal Corporation of Troy; thence westerly 1594 feet more or less along said corporation line to corporation corner, said corner being 352 feet more or less S of S line of Miami Street of said municipal corporation; thence N 518 feet along said corporation line; thence S 63° 00′ E 141 feet; thence S 52° 50′ E 220 feet; thence S 73° 40′ E 408 feet; thence S 60° 30′ E 262 feet; thence S 52° 20′ E 195 feet; thence S 60° 20′ E 245 feet; thence S 75° 00′ E 252 feet; thence S 81° 10′ E 375 feet; thence S 87° 55′ E 156 feet; thence easterly 676 feet more or less to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 23, 770 feet W of NE corner thereof; thence S 6° 05′ E 409 feet; thence S 1° 00′ E 740 feet; thence S 36° 45′ E 280 feet; thence S 13° 20′ E 168 feet; thence S 49° 00′ E 155 feet; thence S 43° 35′ E 340 feet more or less to point on E line of said fractional section; thence S 177 feet more or less along said E line to point on corporation line of Municipal Corporation of Troy; thence northwesterly 2360 feet more or less along said corporation line to point on N line of said fractional section; thence E 138 feet more or less along said N line to place of beginning.

Fractional Section 24

The following lands in Frac. Sec. 24, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 24, 770 feet W of SE corner thereof; thence N 2° 00′ E 805 feet; thence N 7° 30′ W 865 feet; thence N 43° 00′ W 537 feet; thence N 24° 50′ W 562 feet; thence N 9° 45′ W 1115 feet; thence due W 200 feet more or less to point on center line of Miami River; thence southerly 3810 feet more or less along center line of said river to point on S line of said fractional section; thence E 140 feet more or less along said S line to place of beginning.

DAYTON LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Dayton and adjoining lands, are located in Montgomery County, as follows: (Refer to Sheets Nos. 17 to 28 of Exhibit No. 9, which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located within the corporate limits of the Municipal Corporation of Dayton, and in Harrison, Mad River, and Van Buren Townships as follows:

MUNICIPAL CORPORATION OF DAYTON

The following lands within the corporate limits of the Municipal Corporation of Dayton, included within the lines described as follows, to-wit:

Beginning at corporation corner of Municipal Corporation of Dayton, said corner being approximately 150 feet S and 300 feet E of intersection of McOwen Avenue and Stillwater Avenue; thence E 1450 feet along corporation line of said corporation; thence S 31° 45′ E 195 feet; thence S 44° 30′ E 1295 feet; thence S 43° 20′ E 1140 feet; thence N 78° 00′ E 205 feet more or less to point on S line of Herman Avenue; thence E 50 feet along said S line of Herman Avenue; thence S 3° 30′ W 70 feet; thence S 45° 00′ E 370 feet; thence S 39° 30′ W 33 feet; thence S 27° 15′ E 250 feet; thence S 86° 20′ E 240 feet more or less to point on S line of alley S of Detrick Street; thence SE 45 feet more or less along said S line of alley S of Detrick Street; thence southeasterly 195 feet more or less to point on W line of Webster Street, 370 feet S of S line of Detrick Street; thence S 440 feet along straight line joining said point on W line of Webster Street with point where W line of Webster Street intersects S line of Idylwild Avenue; thence S 52° 25′ W 1455 feet; thence S 43° 45′ W 490 feet; thence S 69° 30′ W 555 feet; thence S 80° 30′ W 390 feet; thence S 83° 40′ W 190 feet more or less to point on E line of Main Street; thence N 78° 00′ W 100 feet; thence S 88° 55′ W 1270 feet more or less to point on E line of Liberty Street; thence S 75° 30′ W 240 feet; thence S 38° 10′ W 120 feet more or less to point on S line of De Kalb Street; thence S 58° 00′ W 275 feet; thence S 49° 50′ W 370 feet; thence S 46° 00′ W 135 feet; thence S 42° 00′ W 685 feet; thence S 29° 30′ W 200 feet; thence S 13° 50′ W 515 feet; thence S 2° 10′ W 85 feet; thence S 13° 10′ E 430 feet; thence S 2° 30′ E 85 feet; thence S 23° 55′ E 130 feet; thence N 76° 30′ E 75 feet; thence S 16° 00′ E 50 feet; thence S 26° 00′ E 250 feet more or less to point on N line of Lot 13945; thence E 115 feet along extended N line of said lot; thence S 16° 00′ E 280 feet; thence S 37° 50′ E 435 feet; thence S 89° 10′ E 75 feet; thence S 46° 45′

E 360 feet; thence S 35° 20′ E 215 feet; thence N 63° 50′ E 80 feet more or less to point on W line of alley W of Longworth Street; thence SE 1190 feet more or less along extended W line of said alley to point on S line of Washington Street; thence W 775 feet along said S line of Washington Street and S line of bridge; thence N 42° 00′ W 390 feet; thence N 35° 30′ W 800 feet; thence S 57° 10′ W 40 feet more or less to point on W line of Beach Avenue; thence NW 270 feet more or less along said W line of Beach Avenue to point on N line of Emily Street; thence W 20 feet along said N line of Emily Street; thence N 38° 00′ W 505 feet; thence northerly 665 feet more or less to point of intersection of S line of Fourth Street with W line of Cedar Street; thence N 32° 05′ W 475 feet more or less to point on W line of Bank Street; thence N 200 feet more or less along extended W line of Bank Street; thence N 35° 15′ W 315 feet more or less to point on extended E line of highway bridge over mouth of Wolf Creek; thence N 450 feet along said extended E line; thence N 6° 10′ E 300 feet; thence N 35° 00′ E 840 feet more or less to point on E line of Salem Avenue; thence N 25° 30′ E 100 feet; thence N 38° 10′ E 310 feet; thence N 45° 30′ E 350 feet more or less to point on E line of Dayton View bridge; thence N 63° 25′ W 55 feet more or less to point on S line of River Street; thence northeasterly 860 feet along S line of River Street; thence N 67° 05′ E 800 feet more or less to point on S line of Lehman Street; thence E 1380 feet more or less along said S line of Lehman Street to point of intersection of E line of Main Street with N line of Stillwater Drive; thence E 610 feet more or less along said N line of Stillwater Drive to point on W line of Linwood Street; thence N 25 feet along said W line of Linwood Street; thence N 61° 45′ E 250 feet; thence N 14° 45′ E 255 feet; thence N 3° 00′ W 210 feet; thence N 4° 20′ W 1030 feet more or less to point on S line of Herman Avenue; thence N 12° 50′ W 210 feet; thence N 47° 00′ W 810 feet more or less to point on S line of Bittner Street; thence N 52° 00′ W 205 feet; thence N 49° 15′ W 450 feet; thence N 54° 30′ W 625 feet more or less to point on E line of Stillwater Avenue; thence NW 1745 feet along said E line of Stillwater Avenue; thence N 5° 35′ W 60 feet more or less to point on corporation line; thence southeasterly 595 feet more or less along corporation line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point on E line of Sunset Avenue, 100 feet S of S line of roadway extending W from Second Street to Sunset Avenue, said distance being measured along said E line of avenue; thence S 2° 15′ W 190 feet more or less to point on E line of Sunset Avenue; thence N 205 feet more or less along said E line of Sunset Avenue to place of beginning.

Also all lands and rights within said corporate limits, acquired by the Municipal Corporation of Dayton by reason of the Great Miami River Improvement from the Washington Street bridge southward to the C. C. C. & St. L. Ry. Co. bridge.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Negley Place with extended E line of P. C. C. & St. L. Ry. Co. bridge, said point being approxi-

mately 330 feet W of W line of Summit Street; thence N 78° 50′ E 1225 feet; thence easterly 520 feet more or less to point of intersection of E line of Broadway with S line of Negley Place; thence E 2345 feet more or less along extended S line of Negley Place to point on E line of highway bridge across the mouth of Wolf Creek; thence S 375 feet along extended E line of said bridge; thence N 54° 10′ W 115 feet; thence N 76° 10′ W 740 feet more or less to point on E line of Sweetman Street; thence N 72° 30′ W 535 feet more or less to point on E line of Williams Street; thence N 74° 30′ W 900 feet; thence N 82° 30′ W 135 feet; thence N 89° 30′ W 590 feet; thence S 75° 30′ W 895 feet more or less to point on extended E line of P. C. C. & St. L. Ry. Co. bridge; thence NW 330 feet more or less along said extended E line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point on E corporation line of the Municipal Corporation of Dayton, 90 feet N of the center line of main line roadbed of the Nypano R. R. Co. (Erie R. R. Co.), said distance being measured along said corporation line; thence N 62° 15′ W 130 feet; thence N 18° 00′ W 65 feet; thence S 74° 40′ W 1000 feet; thence S 50° 30′ W 285 feet; thence S 65° 30′ W 760 feet; thence S 62° 05′ W 180 feet; thence S 64° 40′ W 1445 feet; thence southwesterly 445 feet more or less to point of intersection of N line of Binn Street with E line of Thomas Street; thence S 69° 30′ W 1195 feet; thence S 82° 00′ W 180 feet; thence S 89° 45′ W 340 feet; thence S 86° 55′ W 1040 feet; thence S 77° 30′ W 265 feet more or less to point on straight line joining point where W line of Webster Street intersects S line of Idylwild Avenue, with point on W line of Webster Street, 370 feet S of S line of Detrick Street; thence northerly 400 feet along said straight line; thence easterly 855 feet more or less to SE corner of Lot 22242; thence N 87° 15′ E 560 feet; thence S 86° 30′ E 425 feet more or less to point on E line of Valley Road; thence NE 355 feet more or less along E line of said Valley Road to N corner of Lot 11035; thence SE 75 feet along E line of said lot; thence N 65° 25′ E 480 feet; thence N 44° 30′ E 490 feet; thence N 56° 20′ E 430 feet more or less to point on W line of Grant Street; thence N 62° 20′ E 415 feet; thence N 72° 30′ E 1070 feet; thence N 61° 25′ E 350 feet; thence N 49° 25′ E 1015 feet; thence N 77° 00′ E 705 feet; thence N 72° 55′ E 215 feet more or less to point on E corporation line; thence S 915 feet more or less along said corporation line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point on center line of main line roadbed of C. C. C. & St. L. Ry. Co., 30 feet W of W line of Springfield Pike; thence W 295 feet along center line of said main line roadbed; thence N 35° 00′ W 25 feet more or less to point on corporation line of said corporation; thence NE 270 feet along said corporation line; thence southerly 95 feet more or less to place of beginning.

HARRISON AND MAD RIVER TOWNSHIPS

(Refer also to Harrison Township and Mad River Township.)

Such lands in T 2 N, R 6 E, 1st P. M., Harrison Township, are located in Fractional Sections 14, 15, 21, and 22, and in R 7, T 1, M.R's, Mad River Township, in Fractional Sections 6, 11, and 12, as follows:

The following lands included within the lines described as follows, to-wit:

Beginning at a point 95 feet E and 15 feet S of point where S line of Bond Street intersects W line of Stillwater Avenue of the Municipal Corporation of Dayton; thence N 5° 35′ W 415 feet; thence N 1° 00′ E 675 feet; thence N 7° 45′ E 455 feet; thence N 15° 20′ E 620 feet; thence N 19° 40′ E 400 feet; thence N 26° 45′ E 370 feet; thence northeasterly 185 feet more or less to point on E line of Frac. Sec. 21, 1790 feet from NE corner thereof; thence N 32° 00′ E 215 feet; thence N 42° 00′ E 410 feet; thence N 52° 35′ E 550 feet; thence N 60° 40′ E 2315 feet; thence northeasterly 115 feet more or less to point on N line of Frac. Sec. 22, 2945 feet from NW corner thereof; thence northeasterly 2675 feet more or less to point on E line of Frac. Sec. 15, 3860 feet from NE corner thereof; thence N 52° 50′ E 1160 feet; thence S 1° 05′ W 815 feet; thence S 52° 50′ W 3325 feet; thence S 60° 30′ W 2770 feet; thence S 57° 05′ W 260 feet; thence southwesterly 105 feet more or less to point on S line of Frac. Sec. 12, 865 feet from SE corner thereof; thence S 35° 20′ W 540 feet; thence S 18° 50′ W 460 feet; thence S 3° 00′ W 365 feet; thence S 16° 30′ E 570 feet; thence S 31° 10′ E 1800 feet more or less to point on corporation line of the Municipal Corporation of Dayton; thence W 1455 feet along said corporation line extended; thence northwesterly 500 feet more or less to place of beginning.

Excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

HARRISON TOWNSHIP

Such lands in T 1 N, R 6 E, 1st P. M., Harrison Township, are located in Fractional Sections 8 and 9 as follows:

Fractional Section 8

The following lands in Frac. Sec. 8, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 8; thence S 195 feet more or less along E line of said fractional section to point on center line of Miami River; thence westerly 1955 feet more or less along center line of said river to point 1730 feet W and 865 feet more or less S of NE corner of said fractional section; thence N 52° 20′ W 155 feet more or less to point on E line of highway; thence NE 1220 feet more or less along said E line of highway to highway corner; thence N 58° 15′ E 45 feet more or less to point on N line of said fractional section; thence E 845 feet more or less along said N line to place of beginning.

Fractional Section 9

All lands and rights in Frac. Sec. 9, T 1 N, R 6 E, 1st P. M., acquired by the Municipal Corporation of Dayton by reason of the Great Miami

River Improvement from the Washington Street bridge southward to the C. C. C. & St. L. Ry. Co. bridge.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 9; thence E 318 feet along N line of said fractional section; thence S 68° 15′ E 782 feet more or less to point on extended E line of C. C. C. & St. L. Ry. Co. bridge; thence S 540 feet more or less along said extended E line of bridge to point on center line of Miami River; thence westerly 1150 feet more or less along center line of said river to point on W line of said fractional section; thence N 195 feet more or less along said W line to place of beginning.

MAD RIVER TOWNSHIP

Such lands in R 7, T 2, M.R's, Mad River Township, are located in Sections 29 and 35 as follows:

Section 29

The following lands in Sec. 29, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of center line of main line roadbed of Nypano R. R. Co. (Erie R. R. Co.) with W line of Sec. 29; thence N 290 feet along said W line; thence S 38° 00′ E 170 feet; thence N 57° 00′ E 4180 feet; thence S 38° 05′ E 1250 feet more or less to point on corporation line of the Municipal Corporation of Dayton; thence SW 270 feet along said corporation line; thence N 36° 10′ W 450 feet; thence N 71° 50′ W 795 feet; thence S 88° 00′ W 180 feet more or less to point on center line of said main line roadbed; thence SW 3530 feet more or less along center line of said main line roadbed to place of beginning.

Section 35

The following lands in Sec. 35, R 7, T 2, M.R's, included within the lines described as follows, to-wit

Beginning at point on E corporation line of the Municipal Corporation of Dayton, 90 feet N of center line of main line roadbed of the Nypano R. R. Co. (Erie R. R. Co.), said distance being measured along said corporation line; thence N 915 feet along said corporation line; thence N 72° 30′ E 390 feet; thence N 57° 40′ E 285 feet; thence S 38° 00′ E 620 feet more or less to point on E line of Sec. 35; thence S 290 feet more or less along said E line to point on center line of said main line roadbed; thence SW 625 feet along center line of said main line roadbed; thence westerly 235 feet more or less to place of beginning.

VAN BUREN TOWNSHIP

Such lands in R 7, T 1, M.R's, Van Buren Township, are located in Fractional Sections 8 and 14 as follows:

Fractional Section 8

All lands and rights in Frac. Sec. 8, R 7, T 1, M.R's, acquired by the Municipal Corporation of Dayton by reason of the Great Miami River Im-

provement from the Washington Street bridge southward to the C. C. C. & St. L. Ry. Co. bridge.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point of intersection of center line of Miami River with E line of C. C. C. & St. L. Ry. Co. bridge; thence S 310 feet along extended E line of said bridge; thence N 80° 45′ W 820 feet; thence southwesterly 465 feet more or less to point on W line of said fractional section, 790 feet N of SW corner thereof; thence N 880 feet more or less along said W line to point on center line of said river; thence easterly 1500 feet more or less along center line of said river to place of beginning.

Fractional Section 14

The following lands in Frac. Sec. 14, R 7, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 14, 790 feet N of SE corner thereof; thence S 62° 20′ W 895 feet; thence N 44° 35′ W 785 feet more or less to point on center line of Miami River; thence easterly 1600 feet more or less along center line of said river to point on E line of said fractional section; thence S 880 feet more or less along said E line to place of beginning.

WEST CARROLLTON LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of West Carrollton and adjoining lands, are located in Montgomery County as follows: (Refer to Sheets Nos. 3 and 4 of Exhibit No. 10 which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located within the corporate limits of the Municipal Corporation of West Carrollton and in Miami Township as follows:

MUNICIPAL CORPORATION OF WEST CARROLLTON

The following lands within the corporate limits of the Municipal Corporation of West Carrollton, included within the lines described as follows, to-wit:

Beginning at point on N line of Central Avenue of the Municipal Corporation of West Carrollton, 205 feet southwesterly of NW corner of intersection of Bridge Street and Central Avenue; thence N 31° 15′ W 600 feet; thence S 58° 40′ W 65 feet; thence N 31° 45′ W 735 feet; thence N 10° 00′ E 400 feet more or less to point on W line of Bridge Street; thence SE 155 feet along said W line of Bridge Street; thence S 10° 00′ W 250 feet; thence S 31° 30′ E 1250 feet; thence N 79° 10′ E 90 feet; thence S 31° 45′ E 15 feet more or less to point on N line of Central Avenue; thence SW 120 feet more or less along said N line of Central Avenue to place of beginning.

MIAMI TOWNSHIP

Such lands in R 6, T 1, M.R's, Miami Township, are located in Fractional Sections 16, 22, and 28 as follows:

Fractional Section 16

The following lands in Frac. Sec. 16, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 16, 1390 feet N of the SW corner thereof; thence N 30 feet along said W line; thence N 78° 30′ E 1550 feet; thence S 57° 55′ W 70 feet; thence westerly 1480 feet more or less to place of beginning.

Fractional Section 22

The following lands in Frac. Sec. 22, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 22, 1390 feet N of the SE corner thereof; thence S 78° 35′ W 340 feet; thence N 79° 45′ W 310 feet; thence S 65° 50′ W 315 feet more or less to point on N line of highway; thence westerly 75 feet along N line of highway; thence N 65° 00′ E 420 feet; thence S 70° 35′ E 300 feet; thence easterly 350 feet more or less to point on E line of said section, 1420 feet N of SE corner thereof; thence S 30 feet along said E line to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 22, 440 feet N of SW corner thereof; thence N 100 feet along W line of said fractional section; thence N 50° 50′ E 90 feet; thence N 63° 05′ E 840 feet; thence N 83° 25′ E 1880 feet more or less to point on W line of highway; thence southerly 30 feet along W line of said highway: thence S 66° 40′ W 150 feet; thence S 83° 25′ W 1730 feet; thence S 63° 05′ W 810 feet; thence southwesterly 155 feet more or less to place of beginning.

Fractional Section 28

The following lands in Frac. Sec. 28, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 28, 440 feet N of SE corner thereof; thence S 51° 40′ W 45 feet; thence S 21° 50′ W 335 feet more or less to point on E line of highway; thence northerly 185 feet more or less along said E line of highway to highway corner; thence westerly 25 feet along N line of highway; thence N 29° 40′ E 185 feet; thence N 50° 50′ E 140 feet more or less to point on E line of said fractional section; thence S 100 feet more or less along E line of said fractional section to place of beginning.

MIAMISBURG LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Miamisburg and adjoining lands, are located in Montgomery County as follows: (Refer to Sheets Nos. 3 and 4 of Exhibit No. 11 which are hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located within the corporate limits of the Municipal Corporation of Miamisburg and in Miami Township as follows:

MUNICIPAL CORPORATION OF MIAMISBURG

The following lands within the corporate limits of the Municipal Corporation of Miamisburg, included within the lines described as follows, to-wit:

Beginning at point of intersection of N corporation line of Municipal Corporation of Miamisburg with a line 50 feet from and parallel with the center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed; thence E 800 feet more or less along said N corporation line to corporation corner on E bank of Miami River; thence northeasterly 1365 feet more or less along said corporation line to corporation corner; thence E 140 feet along N corporation line; thence S 44° 50′ W 270 feet; thence S 42° 45′ W 378 feet more or less to point on N line of Lot 9; thence S 40° 50′ W 542 feet more or less to point on N line of Lot 5; thence S 31° 20′ W 110 feet more or less to point on N line of Lot 4; thence S 15° 50′ W 95 feet more or less to point on N line of Lot 3; thence S 8° 45′ W 340 feet more or less to point on S line of Lot 1; thence S 3° 10′ W 300 feet; thence southerly 155 feet more or less to NW corner of Lot 404; thence S 16° 00′ W 220 feet; thence southerly 125 feet more or less to W corner of Lot 947; thence S 13° 30′ E 190 feet more or less to point on W line of Main Street; thence southwesterly 235 feet along said W line of Main Street; thence N 81° 00′ W 140 feet; thence S 67° 50′ W 210 feet more or less to point on SW line of Lot 140; thence S 42° 20′ W 470 feet more or less to point on SW line of Lot 136; thence S 27° 15′ W 145 feet; thence S 34° 25′ W 555 feet; thence S 24° 00′ W 205 feet more or less to point on W line of Miami Avenue; thence S 120 feet more or less along said W line of Miami Avenue to SE corner of Lot 148; thence W 30 feet along S line of Lot 148; thence S 25° 10′ W 135 feet; thence S 41° 30′ E 25 feet more or less to point on S line of Lot 151; thence S 10° 40′ W 250 feet more or less to point on N line of Lot 154; thence E 10 feet along N line of Lot 154; thence S 10° 40′ W 60 feet; thence N 78° 45′ W 10 feet; thence S 10° 40′ W 650 feet more or less to point on S line of Lot 691; thence S 2° 50′ W 255 feet more or less to point on S line of Lot 697; thence E 25 feet more or less along S line of Lot 697 to SE corner thereof; thence S 8° 45′ W 555 feet; thence S 18° 35′ W 515 feet; thence S 61° 05′ E 43 feet more or less to point on W line of Old Main Street; thence S 45 feet more or less along said W line of Old Main Street to SE corner of Lot 210; thence S 37° 40′ W 30 feet; thence S 21° 25′ W 160 feet; thence S 17° 50′ W 425 feet; thence S 27° 05′ W 550 feet more or less to point on S corporation line; thence W 145 feet more or less along said S corporation line to corporation corner; thence N 1820 feet more or less along corporation line to corporation corner; thence W 870 feet more or less along corporation line to corporation corner; thence S 640 feet more or less along corporation line to corporation corner; thence W 17 feet more or less along corporation line to point on line 50 feet from and parallel with the center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed; thence northerly 5675 feet more or less along said parallel line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Municipal Corporation of Miamisburg with N line of 15.76-acre tract owned by W. H. Albrecht et al.; thence E 90 feet along N line of said tract; thence N 17° 45′ E 212 feet; thence S 80° 00′ E 30 feet; thence S 4° 20′ W 195 feet; thence N 89° 00′ E 205 feet more or less to point on line 50 feet from and parallel with center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being W of said roadbed; thence southerly 1582 feet along said parallel line; thence S 64° 00′ E 28 feet; thence S 21° 00′ W 143 feet; thence N 64° 10′ W 278 feet; thence N 40° 40′ W 215 feet; thence N 26° 40′ W 255 feet more or less to point on W line of said corporation; thence N 85 feet more or less along said W corporation line to point on S line of highway; thence easterly 35 feet along S line of highway; thence S 28° 20′ E 240 feet; thence S 40° 30′ E 230 feet; thence N 70° 35′ E 175 feet; thence N 11° 30′ W 327 feet more or less to point on S line of highway; thence E 50 feet along S line of highway; thence S 10° 00′ E 240 feet; thence N 15° 45′ E 240 feet; thence N 81° 05′ W 50 feet; thence N 2° 00′ W 30 feet; thence N 83° 00′ E 200 feet more or less to point on W line of highway; thence N 270 feet along W line of said highway; thence S 79° 20′ E 70 feet; thence N 21° 10′ E 700 feet; thence S 88° 30′ W 70 feet; thence N 76° 40′ W 85 feet; thence S 16° 30′ W 225 feet; thence N 81° 00′ W 25 feet; thence N 4° 00′ E 210 feet; thence westerly 90 feet more or less to point on W line of said corporation, 55 feet S of place of beginning; thence N 55 feet along said W corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Municipal Corporation of Miamisburg with E line of Cincinnati Pike; thence E 70 feet along said N corporation line; thence S 41° 35′ E 120 feet; thence S 7° 00′ W 20 feet; thence N 63° 30′ W 95 feet; thence N 53° 45′ W 55 feet; thence S 42° 10′ W 250 feet; thence N 52° 30′ W 155 feet; thence N 37° 55′ E 167 feet more or less to point on said N corporation line; thence E 180 feet more or less along said corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at NW corner of Lot 132 of the Municipal Corporation of Miamisburg, said NW corner being on E line of Main Street; thence S 54° 00′ E 390 feet more or less to point on W line of Fourth Street; thence S 83° 00′ E 185 feet; thence S 82° 00′ E 125 feet; thence S 72° 45′ E 150 feet; thence S 17° 00′ W 40 feet; thence westerly 260 feet more or less to NE corner of Lot 980; thence W 140 feet more or less along N line of Lot 980 to NW corner thereof; thence N 71° 20′ W 75 feet; thence N 60° 10′ W 150 feet; thence N 54° 10′ W 255 feet more or less to point on E line of Main Street; thence NE 70 feet more or less along E line of Main Street to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on E line of Main Street of the Municipal Corporation of Miamisburg, 70 feet northeasterly from NW corner of Lot 132; thence NE 185 feet along E line of Main Street; thence S 70° 30′ E 120 feet; thence

63° 40′ E 130 feet; thence S 26° 35′ E 115 feet; thence S 69° 15′ E 175 feet; thence S 65° 15′ E 195 feet; thence S 17° 05′ W 45 feet; thence N 71° 35′ W 225 feet; thence N 62° 20′ W 270 feet; thence N 25° 50′ E 45 feet; thence N 61° 15′ W 145 feet; thence S 87° 00′ W 65 feet; thence S 35° 30′ W 105 feet; thence northwesterly 75 feet more or less to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at SE corner of intersection of Ferry Street and Miami Avenue of the Municipal Corporation of Miamisburg; thence E 15 feet along S line of Ferry Street; thence S 23° 45′ W 62 feet more or less to point on E line of Miami Avenue; thence N 60 feet more or less along E line of Miami Avenue to place of beginning.

MIAMI TOWNSHIP

Such lands in T 2 N, R 5 E, 1st P. M., Miami Township, are located in Fractional Sections 2 and 10 as follows:

Fractional Section 2

The following lands in Frac. Sec. 2, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of the N corporation line of the Municipal Corporation of Miamisburg with a line 50 feet from and parallel with the center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed; thence northerly 1380 feet along said parallel line; thence S 80° 00′ E 605 feet; thence S 81° 30′ E 600 feet more or less to point on center line of Miami River; thence southwesterly 1525 feet more or less along center line of said river to point on N line of said corporation; thence W 675 feet more or less along said N corporation line to place of beginning.

Fractional Section 10

The following lands in Frac. Sec. 10, T 2 N, R 5 E, 1st P. M., to-wit:

All lands in Frac. Sec. 10 lying E of a line 50 feet from and parallel with the center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed, excepting those lands included within the corporate limits of the Municipal Corporation of Miamisburg and excepting also all lands included within the lines described as follows, to-wit:

Beginning at intersection of said parallel line with S line of said fractional section; thence N 525 feet along said parallel line; thence S 76° 30′ E 540 feet more or less to point on center line of Miami River; thence southerly 410 feet more or less along center line of said river to point on S line of said fractional section; thence W 485 feet more or less along S line of said fractional section to place of beginning.

MIAMI TOWNSHIP

Such lands in R 6, T 1, M.R's, Miami Township, are located in Fractional Sections 26 and 36 as follows:

Fractional Section 26

The following lands in Frac. Sec. 26, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Municipal Corporation of Miamisburg, 70

feet E of intersection of said N corporation line with E line of Cincinnati Pike; thence W 465 feet more or less along corporation line to corporation corner; thence southwesterly 300 feet more or less along said corporation line to point on W line of said fractional section; thence N 210 feet more or less along W line of said fractional section to point on center line of Miami River; thence northeasterly 200 feet more or less along center line of said river to point N 81° 30′ W 365 feet more or less from a point 168 feet W and 110 feet N of place of beginning; thence S 81° 30′ E 365 feet more or less to said point; thence N 37° 40′ E 260 feet; thence S 51° 35′ E 138 feet more or less to point on E line of Cincinnati Pike; thence S 32° 35′ W 255 feet; thence southeasterly 35 feet more or less to place of beginning.

Fractional Section 36

The following lands in Frac. Sec. 36, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on S corporation line of Municipal Corporation of Miamisburg, 540 feet W of W line of first highway W of M. & E. Canal; thence S 29° 10′ W 335 feet; thence S 27° 50′ W 330 feet; thence S 25° 00′ W 310 feet; thence S 18° 30′ W 290 feet; thence S 6° 50′ W 140 feet more or less to point on N line of tract containing 6.0 acres, said tract being now owned by Manda and George Cramer; thence S 23° 00′ E 95 feet; thence S 71° 10′ E 135 feet; thence N 89° 45′ E 525 feet; thence N 2° 30′ E 100 feet; thence S 89° 00′ E 65 feet; thence S 2° 45′ W 250 feet; thence N 89° 00′ W 65 feet; thence N 2° 45′ E 100 feet; thence S 89° 45′ W 560 feet; thence N 76° 30′ W 540 feet more or less to point on center line of Miami River; thence northerly 2040 feet more or less along center line of said river to point on N line of said fractional section; thence E 95 feet more or less along N line of said fractional section to point on W line of said corporation; thence S 510 feet more or less along corporation line to corporation corner; thence E 145 feet more or less along S corporation line to place of beginning.

CHAUTAUQUA LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which **may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Village of Chautauqua and adjoining lands, are located in Montgomery County, as follows:**

(Refer to Sheet No. 2 of Exhibit No. 12 which is hereby made a part of the following descriptions.)

MONTGOMERY COUNTY

Such lands as lie in Montgomery County are located in Miami Township, as follows:

MIAMI TOWNSHIP

Such lands in T 2 N, R 5 E, 1st P. M., Miami Township, are located in Fractional Sections 22 and 27 as follows:

Fractional Section 22

The following lands in Frac. Sec. 22, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 22, 3770 feet E of SW corner thereof; thence N 11° 05′ W 580 feet; thence N 16° 20′ W 285 feet; thence N 71° 30′ E 40 feet; thence S 17° 05′ E 355 feet; thence S 10° 00′ E 525 feet more or less to point on S line of said fractional section; thence W 40 feet more or less along S line of said fractional section to place of beginning.

Also the following lands in said fractional section included within lines described as follows, to-wit:

Beginning at point on W line of first highway W of Miami River, 1580 feet northerly along said W line from S line of Frac. Sec. 22; thence N 46° 35′ W 420 feet; thence N 53° 20′ W 450 feet; thence N 27° 30′ E 90 feet; thence S 56° 15′ E 415 feet; thence S 45° 45′ E 395 feet more or less to point on W line of said highway; thence S 45 feet along W line of said highway; thence S 40° 50′ E 210 feet; thence S 50° 00′ W 30 feet; thence N 41° 30′ W 165 feet more or less to point on W line of said highway; thence S 35 feet more or less along W line of said highway to place of beginning.

Fractional Section 27

The following lands in Frac. Sec. 27, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 27, 3810 feet E of NW corner thereof; thence S 12° 55′ E 270 feet; thence S 15° 10′ E 130 feet; thence S 78° 20′ W 40 feet; thence N 15° 10′ W 120 feet; thence N 12° 55′ W 280 feet more or less to point on N line of said fractional section; thence E 40 feet more or less along N line of said fractional section to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at SW corner of Lot 32 of the Village of Chautauqua; thence northerly 90 feet along W line of Lots 32 and 35 of said village; thence N 31° 25′ W 120 feet more or less to point on S line of Lot 42 of said village; thence northwesterly 530 feet more or less to NW corner of Lot 156 of said village; thence N 32° 45′ W 220 feet; thence N 37° 00′ W 665 feet; thence N 27° 20′ W 300 feet; thence N 67° 00′ E 45 feet; thence S 28° 40′ E 290 feet; thence S 34° 20′ E 740 feet; thence S 30° 30′ E 155 feet more or less to point on N line of Lot 156 of said village; thence E 40 feet along N line of Lots 156 and 157 of said village; thence southeasterly 570 feet more or less to SE corner of Lot 45 of said village; thence S 200 feet more or less along extended E line of Lots 34 and 33 of said village to the SE corner of Lot 33; thence W 100 feet more or less along S line of said Lots 33 and 32 to place of beginning.

FRANKLIN LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Franklin and adjoining lands, are located in Warren County as follows: (Refer to Sheets Nos. 4 and 5 of Exhibit No. 13 which are hereby made a part of the following descriptions.)

WARREN COUNTY

Such lands as lie in Warren County are located within the corporate limits of the Municipal Corporation of Franklin and in Franklin Township as follows:

MUNICIPAL CORPORATION OF FRANKLIN

The following lands within the corporate limits of the Municipal Corporation of Franklin, included within the lines described as follows, to-wit:

Beginning at point on N corporation line of the Municipal Corporation of Franklin, 855 feet westerly along said line from W line of Front Street; thence S 19° 00′ W 1410 feet more or less to point on S line of Lot 205; thence S 13° 00′ W 155 feet more or less to point on S line of Lot 207; thence S 2° 00′ W 115 feet more or less to point on N line of Van Horn Avenue; thence S 2° 00′ W 80 feet; thence S 15° 15′ W 1245 feet more or less to point on S line of Jackson Street; thence S 9° 10′ W 425 feet more or less to point on N line of First Street; thence S 18° 45′ W 65 feet; thence S 15° 50′ W 155 feet; thence S 25° 05′ W 310 feet; thence S 60° 00′ E 38 feet more or less to point on W line of Front Street; thence SW 1400 feet more or less along W line of Front Street to NE corner of Lot 553; thence W 45 feet along N line of Lot 553; thence S 43° 25′ W 470 feet more or less to point on S line of Sixth Street; thence S 55° 50′ W 550 feet; thence S 58° 45′ W 380 feet; thence S 67° 35′ W 325 feet more or less to point on W corporation line of said corporation; thence N 650 feet more or less along W corporation line to point on S line of Oxford Road; thence northeasterly 775 feet along S line of Oxford Road; thence N 27° 25′ W 158 feet; thence N 41° 05′ E 210 feet; thence S 65° 00′ E 90 feet; thence N 46° 15′ E 135 feet; thence S 61° 00′ E 40 feet more or less to point on E line of Oxford Road; thence northerly 1490 feet along E line of Oxford Road; thence N 79° 30′ W 45 feet more or less to point on W line of Oxford Road; thence N 1° 20′ E 360 feet more or less to point on S line of Lake Avenue; thence N 5° 45′ W 220 feet; thence N 12° 20′ W 95 feet; thence N 16° 05′ W 390 feet; thence N 13° 40′ W 160 feet more or less to point on N line of Home Avenue; thence N 8° 45′ W 270 feet; thence N 2° 30′ W 225 feet; thence N 2° 40′ E 185 feet more or less to point on corporation line of said corporation; thence southeasterly 825 feet more or less along said corporation line to corporation corner; thence northeasterly 1800 feet more or less along corporation line to corporation corner; thence southeasterly 200 feet more or less along corporation line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at NW corner of Lot 787 of the Municipal Corporation of Franklin, said corner being on E line of Front Street; thence S 19° 00′ W 55 feet more or less to point on S line of Lot 787; thence SE 250 feet along S line of Lot 787 and said S line extended; thence S 28° 30′ W 40 feet; thence N 62° 20′ W 260 feet more or less to point on E line of Front Street; thence S 40 feet along E line of Front Street; thence northwesterly 145 feet more or less to E corner of Lot 162 of Park Place Addition; thence northwesterly 170 feet more or less along NE line of Lot 162 to point on W corporation line of said corporation; thence N 85 feet along said corporation line; thence southeasterly 330 feet more or less to place of beginning.

FRANKLIN TOWNSHIP

Such lands in R 5, T 1, M.R's, Franklin Township, are located in Fractional Section 1 as follows:

Fractional Section 1

The following lands in Frac. Sec. 1, R 5, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at N corner of Lot 162 of Park Place Addition, part of said addition being a part of the Municipal Corporation of Franklin; thence SW 65 feet along NW line of Lots 162 and 163; thence N 34° 15′ W 40 feet; thence N 68° 15′ E 60 feet; thence N 47° 30′ W 90 feet more or less to point on S line of Lot 151; thence SW 75 feet more or less to SW corner of Lot 151; thence NE 70 feet along W line of Lot 151; thence N 47° 30′ W 145 feet more or less to point on S line of Lot 91; thence W 35 feet more or less along S line of Lot 91 to SW corner thereof; thence N 43° 50′ W 60 feet; thence N 1° 20′ W 1025 feet; thence N 41° 35′ E 430 feet; thence N 51° 55′ E 322 feet; thence N 59° 15′ E 190 feet; thence N 67° 35′ E 270 feet more or less to point on W corporation line of Municipal Corporation of Franklin; thence S 55 feet along said corporation line; thence S 56° 50′ W 590 feet; thence S 43° 15′ W 410 feet; thence S 24° 15′ W 205 feet; thence southerly 855 feet more or less to NW corner of Lot 90 of Park Place Addition; thence S 15 feet along W line of Lot 90; thence S 48° 00′ E 70 feet more or less to point on S line of Lot 90; thence E 60 feet more or less along S line of Lot 90 to SE corner thereof; thence S 20 feet along E line of Lot 91; thence S 48° 00′ E 70 feet more or less to point on N line of Lot 151; thence E 75 feet more or less along N line of Lot 151 to NE corner thereof; thence S 25 feet more or less along E line of Lot 151 to SE corner thereof; thence S 48° 00′ E 90 feet; thence N 70° 00′ E 60 feet more or less to point on W corporation line of said corporation; thence S 130 feet more or less to point on NE line of Lot 162; thence NW 70 feet more or less along NE line of Lot 162 to place of beginning.

FRANKLIN TOWNSHIP

Such lands in R 5, T 2, M.R's, Franklin Township, are located in Fractional Section 32 as follows:

Fractional Section 32

The following lands in Frac. Sec. 32, R 5, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on SE line of Lot 6, 25 feet NE of the S corner there-

of, said point being on W line of extension of Front Street of the Municipal Corporation of Franklin; thence NE 100 feet along E line of Lots 6 and 7; thence S 66° 00′ E 78 feet; thence S 22° 50′ W 275 feet; thence N 66° 00′ W 78 feet more or less to point on E line of Lot 4; thence NE 100 feet along E line of Lots 4 and 5; thence N 66° 25′ W 234 feet; thence N 62° 25′ W 194 feet; thence S 67° 30′ W 75 feet; thence S 76° 00′ W 455 feet more or less to point on N corporation line of the Municipal Corporation of Franklin, thence NW 75 feet along said N corporation line; thence N 33° 30′ E 32 feet; thence N 75° 00′ E 208 feet; thence N 79° 45′ E 120 feet; thence N 66° 50′ E 50 feet; thence N 75° 00′ E 156 feet; thence S 87° 40′ E 55 feet more or less to point on NW line of Lot 6; thence S 69° 55′ E 160 feet; thence southeasterly 280 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at N corporation corner of the Municipal Corporation of Franklin; thence SW 1795 feet more or less along corporation line to corporation corner; thence W 170 feet more or less along corporation line to point on center line of Miami River; thence northerly 1850 feet more or less along center line of said river to point on N corporation line extended; thence southeasterly 250 feet more or less along said N corporation line extended to place of beginning.

FRANKLIN TOWNSHIP

Such lands in T 1 N, R 5 E, 1st P. M., Franklin Township, are located in Fractional Sections 3 and 4 as follows:

Fractional Section 3

The following lands in Frac. Sec. 3, T 1 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 3, 320 feet E of NW corner thereof; thence E 820 feet more or less along N line of said fractional section to point on center line of Miami River; thence southerly 360 feet more or less along center line of said river to point on corporation line of the Municipal Corporation of Franklin; thence W 755 feet more or less along said corporation line to point 295 feet from corporation corner; thence northerly 170 feet more or less to place of beginning.

Fractional Section 4

The following lands in Frac. Sec. 4, T 1 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 4, 850 feet W of NE corner thereof; thence S 63° 30′ W 370 feet; thence S 56° 30′ W 145 feet more or less to point on N line of Carlisle Avenue; thence W 30 feet along N line of Carlisle Avenue; thence S 51° 00′ W 130 feet more or less to point on NW line of Lot 310; thence SW 92 feet more or less along NW line of Lot 310 to point on N line of Spring Avenue; thence southwesterly 60 feet more or less to N corner of Lot 302; thence SW 290 feet along NW line of Lots 302 and 84 and said line extended; thence S 60° 00′ E 405 feet; thence S 27° 00′ W 60 feet more or less to point on S line of Lake Avenue; thence N 66° 05′ W 400 feet more or less to point on NW line of Lot 292; thence southwesterly 150 feet more or less along NW line of Lot 292 and said line extended to point

on NE line of Lot 285; thence S 26° 30′ E 170 feet more or less to point on NE line of Lot 283; thence SE 110 feet more or less along NE line of Lot 283 to E corner thereof; thence SW 85 feet along SE line of Lot 283 and said line extended; thence S 26° 30′ E 100 feet more or less to point on S line of Park Avenue; thence SE 185 feet more or less along S line of Park Avenue to N corner of Lot 243; thence SW 135 feet along NW line of Lot 243; thence S 26° 30′ E 100 feet more or less to point on NE line of Lot 244; thence SE 145 feet more or less along NE line of Lot 244 to point on W line of Chestnut Street; thence SW 70 feet along W line of Chestnut Street; thence S 63° 30′ E 60 feet more or less to point on E line of Chestnut Street; thence NE 70 feet more or less along E line of Chestnut Street to N corner of Lot 132; thence SE 50 feet more or less along NE line of Lot 132 to E corner thereof; thence SW 120 feet along SE line of Lot 132; thence S 41° 00′ E 80 feet more or less to point on N line of Forest Avenue; thence S 26° 30′ W 45 feet more or less to point on S line of Forest Avenue; thence SE 365 feet more or less along S line of Forest Avenue to point of intersection with E line of Pine Street; thence SW 420 feet along E line of Pine Street and said line extended; thence N 27° 15′ W 50 feet more or less to point on W line of Pine Street extended; thence NE 340 feet along W line of Pine Street and said line extended; thence N 65° 30′ W 210 feet; thence N 55° 40′ W 200 feet; thence northerly 85 feet more or less to W corner of Lot 132; thence N 63° 15′ W 95 feet more or less to point on line 30 feet from and parallel with center line of main line roadbed of C. N. R. R. Co., said parallel line being E of said roadbed; thence northwesterly 995 feet more or less along said parallel line to point on extended SE line of Lot 289; thence NE 140 feet along SE line of Lot 289 and said line extended; thence N 59° 30′ W 270 feet; thence N 27° 25′ W 140 feet; thence S 65° 05′ E 380 feet more or less to point on NW line of Lot 82; thence NE 345 feet more or less along NW line of Lots 82 and 304 and said line extended to point on N line of Spring Avenue; thence NW 25 feet more or less along N line of Spring Avenue to W corner of Lot 308; thence NE 105 feet more or less along NW line of Lot 308 to N corner thereof; thence E 68 feet along N line of Lot 308; thence N 52° 00′ E 78 feet more or less to point on N line of Carlisle Avenue; thence W 35 feet along N line of Carlisle Avenue; thence N 56° 55′ E 128 feet; thence N 61° 05′ E 310 feet more or less to point on N line of said fractional section; thence E 220 feet more or less along N line of said fractional section to place of beginning.

FRANKLIN TOWNSHIP

Such lands in T 2 N, R 5 E, 1st P. M., Franklin Township, are located in Section 33 and Fractional Section 34 as follows:

Section 33

The following lands in Sec. 33, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 33, 850 feet W of the SE corner thereof; thence W 225 feet along S line of said section; thence N 62° 30′ E 780 feet; thence S 74° 30′ E 395 feet more or less to point on E line of said section; thence S 110 feet along E line of said section; thence N 74° 30′ W 380 feet; thence southwesterly 540 feet more or less to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 34, 254 feet N of the SW corner thereof; thence S 74° 30′ E 395 feet; thence N 28° 15′ E 80 feet more or less to point on W line of highway; thence S 72° 00′ E 40 feet more or less to point on E line of highway; thence northeasterly 1610 feet more or less along E line of highway to point on extended N line of Municipal Corporation of Franklin; thence SE 250 feet more or less along said extended N line to point on center line of Miami River; thence southerly 1500 feet more or less along center line of said river to point on S line of said fractional section; thence W 830 feet more or less along S line of said fractional section to point 325 feet E of SW corner thereof; thence N 6° 00′ E 50 feet; thence N 74° 30′ W 340 feet more or less to point on W line of said fractional section; thence N 110 feet more or less along W line of said fractional section to place of beginning.

MIDDLETOWN LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Middletown and adjoining lands, are located in Butler County as follows: (Refer to Sheets Nos. 6, 7, 8, 9, and 10 of Exhibit No. 14 which are hereby made a part of the following descriptions.)

BUTLER COUNTY

Such lands as lie in Butler County are located within the corporate limits of the Municipal Corporation of Middletown and in Lemon and Madison Townships as follows:

MUNICIPAL CORPORATION OF MIDDLETOWN

The following lands within the corporate limits of the Municipal Corporation of Middletown, included within the lines described as follows, to-wit:

Beginning at point on E corporation line of the Municipal Corporation of Middletown, 238 feet N of the S line of Tytus Avenue, said distance being measured along said corporation line; thence S 79° 20′ W 275 feet; thence S 87° 05′ W 180 feet; thence westerly 830 feet more or less to NW corner of Lot 3484; thence westerly 575 feet more or less to SE corner of Lot 2566; thence N 87° 40′ W 422 feet; thence S 71° 00′ W 75 feet; thence S 61° 45′ W 55 feet more or less to point on W line of Hughes Street; thence S 15 feet more or less along E line of Lot 2581 to SE corner thereof; thence W 70 feet along S line of Lot 2581; thence S 45° 10′ W 150 feet; thence S 30° 05′ W 90 feet; thence S 16° 30′ W 195 feet; thence southwesterly 135 feet more or less to SW corner of Lot 2511; thence S 32° 05′ W 210 feet; thence S 44° 20′ W 575 feet more or less to point on N line of Tytus Avenue; thence southwesterly 170 feet more or less to SW corner of intersection of Hydraulic Street and Clark Street; thence westerly

1880 feet more or less along S line of Hydraulic Street to N corner of Lot 1; thence westerly 120 feet more or less to E corner of Lot 22; thence SW 100 feet more or less along SE line of Lot 22 to S corner thereof; thence NW 70 feet along SW line of Lot 22; thence S 84° 30′ W 185 feet more or less to point on SE line of Lot 42; thence SW 170 feet more or less along SE line of Lots 42 and 43 to S corner of Lot 43; thence northwesterly 110 feet more or less along SW line of Lot 43 and said line extended to point on E bank of Hydraulic Canal; thence northeasterly 2610 feet more or less along S bank of Hydraulic Canal to point N 45° 00′ W 155 feet more or less from SE corner of the intersection of Tytus Avenue and Clark Street; thence S 45° 00′ E 85 feet more or less to point on S bank of M. & E. Canal; thence northeasterly 3950 feet more or less along S bank of M. & E. Canal to point on said E corporation line; thence S 80 feet more or less along said E corporation line tc place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on N line of Fifth Street of the Municipal Corporation of Middletown, 670 feet W of W line of Main Street, said distance being measured along N line of Fifth Street; thence NW 186 feet along N line of Fifth Street; thence southwesterly 75 feet more or less to NE corner of Lot 80; thence SW 110 feet more or less along E line of Lot 80 to point on N line of alley; thence NW 75 feet more or less along extended N line of alley to point on E line of Lot 267; thence southerly 525 feet more or less along E line of Lots 267, 3778, and 3779 to SE corner of Lot 3779; thence S 22° 15′ W 655 feet more or less to point on N line of Sixth Street; thence S 35° 45′ W 190 feet more or less to point on E line of Lot 872; thence S 155 feet more or less along E line of Lot 872 to SE corner thereof; thence W 100 feet more or less along S line of Lot 872 to NE corner of Lot 881; thence S 195 feet more or less along E line of Lot 881 to SE corner thereof; thence W 110 feet more or less along S line of Lot 881 to NE corner of Lot 882; thence S 150 feet more or less along E line of Lot 882 to SE corner thereof; thence W 90 feet more or less along S line of Lot 882 to NE corner of Lot 893; thence S 150 feet more or less along E line of Lot 893 to SE corner thereof; thence W 150 feet along S line of Lot 893; thence S 40° 45′ W 115 feet more or less to point on W line of Maple Street; thence southerly 2135 feet more or less along W line of Maple Street and W line of alley extending southerly from said street to point on S corporation line of said corporation; thence W 450 feet more or less along S corporation line to corporation corner; thence northeasterly 5730 feet more or less along corporation line to N corner of Lot 253; thence SE 280 feet along NE line of Lots 253 and 250; thence N 52° 35′ E 105 feet more or less to point on NE line of Lot 1697; thence S 35° 35′ W 200 feet more or less to point on SW line of Lot 250; thence southwesterly 255 feet more or less to place of beginning.

LEMON TOWNSHIP

(Refer also to "Madison and Lemon Townships.")

Such lands in R 4, T 2, M.R's, Lemon Township, are located in Sections 23 and 27 and in Fractional Section 33 as follows:

Section 23

The following lands in Sec. 23, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E corporation line of the Municipal Corporation of Middletown, 320 feet N of the S line of Tytus Avenue, said distance being measured along said corporation line; thence N 63° 30′ E 415 feet; thence S 23° 40′ E 270 feet; thence S 72° 25′ W 102 feet; thence N 23° 05′ W 210 feet; thence S 61° 50′ W 175 feet; thence S 55° 45′ W 165 feet more or less to point on said corporation line; thence N 80 feet more or less along said corporation line to place of beginning.

Section 27

The following lands in Sec. 27, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 27, 2040 feet N of SW corner thereof; thence N 95 feet more or less along W line of said section to point on S line of first alley S of Montgomery Avenue of Cloverdale Subdivision; thence E 1200 feet along said S line of alley of Cloverdale Subdivision and said S line extended; thence S 35° 40′ W 65 feet; thence N 86° 00′ W 128 feet; thence S 38° 30′ W 60 feet; thence westerly 1000 feet more or less to place of beginning.

Fractional Section 33

The following lands in Frac. Sec. 33, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 33, 2040 feet N of SE corner thereof; thence N 85° 05′ W 1095 feet; thence N 3° 50′ E 480 feet more or less to point on S line of Lot 17 of Rainbow Row Subdivision; thence W 45 feet along S line of Lot 17 of Rainbow Row Subdivision to SW corner thereof; thence northerly 675 feet more or less along W line of Lots 1 to 17 inclusive of Rainbow Row Subdivision to NW corner of said Lot 1; thence N 86° 00′ W 15 feet; thence N 17° 15′ E 475 feet; thence N 20° 50′ E 570 feet; thence N 53° 30′ E 50 feet; thence N 45° 20′ E 135 feet more or less to point on W line of Main Street; thence southwesterly 1165 feet along W line of Main Street; thence S 4° 30′ W 1085 feet; thence southeasterly 35 feet more or less to intersection of S line of first alley S of Montgomery Avenue of Cloverdale Subdivision with E line of Main Street; thence E 990 feet more or less along S line of said alley to point on E line of said fractional section; thence S 95 feet more or less along E line of said fractional section to place of beginning.

MADISON TOWNSHIP

(Refer also to "Madison and Lemon Townships.")

Such lands in T 2 N, R 4 E, 1st P. M., Madison Township, are located in Fractional Section 22, as follows:

Fractional Section 22

The following lands in Frac. Sec. 22, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W right-of-way line of C. H. & D. Ry. Co., 380 feet S of S line of highway, said highway being a continuation of Third Street

of the Municipal Corporation of Middletown, and said distance being measured along said W right-of-way line; thence S 2° 20′ E 120 feet; thence S 9° 20′ W 65 feet; thence S 68° 00′ W 32 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence N 200 feet more or less along said W right-of-way line to place of beginning.

MADISON AND LEMON TOWNSHIPS

(Refer also to Madison Township and Lemon Township.)

Such lands in Madison and Lemon Townships are located in Fractional Sections 22, 27, and 28, T 2 N, R 4 E, 1st P. M., and in Fractional Sections 28, 29, and 33, R 4, T 2, M.R's, as follows:

The following lands included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 22 with a line 50 feet from and parallel with center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed; thence E 1010 feet along N line of Frac. Sec. 22; thence S 23° 00′ E 1140 feet; thence N 81° 25′ E 490 feet; thence southeasterly 248 feet more or less to corporation corner of the Municipal Corporation of Middletown; thence S 20° 15′ W 1220 feet; thence S 9° 15′ E 990 feet more or less to point on corporation line; thence southwesterly 5720 feet more or less along corporation line to corporation corner; thence E 640 feet more or less along S corporation line to point on W line of Main Street; thence SW 335 feet along W line of said street; thence S 44° 05′ W 238 feet; thence S 56° 40′ W 204 feet; thence S 65° 10′ W 168 feet; thence S 33° 40′ W 205 feet; thence S 58° 30′ W 640 feet more or less to point on W line of Frac. Sec. 27; thence S 89° 05′ W 430 feet; thence N 2° 20′ W 2535 feet more or less to point on line 50 feet from and parallel with center line of main line roadbed of C. H. & D. Ry. Co., said parallel line being E of said roadbed; thence northerly 6375 feet more or less along said parallel line to place of beginning.

HAMILTON LOCAL PROTECTION

Lands now within the limits of The Miami Conservancy District which may be damaged, or which it may be necessary for the District to take for the purposes of the District, by reason of the construction of the protection works for the Municipal Corporation of Hamilton and adjoining lands, are located in Butler County, as follows:

(Refer to Sheets Nos. 10, 11, 12, 13, 14, and 15 of Exhibit No. 15 which are hereby made a part of the following descriptions.)

BUTLER COUNTY

Such lands as lie in Butler County are located within the corporate limits of the Municipal Corporation of Hamilton, and in St. Clair and Fairfield Townships, as follows:

MUNICIPAL CORPORATION OF HAMILTON

The following lands within the corporate limits of the Municipal Corporation of Hamilton, included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 29, T 2 N, R 3 E, 1st P. M.,

where N corporation line of the Municipal Corporation of Hamilton intersects said E line, which point is 1685 feet more or less S of NE corner of said fractional section; thence E 390 feet more or less along said N corporation line to corporation corner; thence southwesterly 2510 feet more or less along corporation line to corporation corner; thence easterly 1080 feet more or less along corporation line to point on line 30 feet from and parallel with center line of track of P. C. C. & St. L. Ry. Co., said parallel line being E of said track; thence SW 25 feet more or less along said parallel line to point on S bank of old river channel; thence easterly 580 feet more or less along S bank of old river channel to point on E corporation line of Municipal Corporation of Hamilton; thence S 660 feet more or less along said corporation line to SW corner of Frac. Sec. 33, R 3, T 2, M. R's; thence S 1218 feet along said corporation line; thence S 1218 feet along said corporation line; thence N 54° 40′ W 200 feet; thence N 61° 20′ W 368 feet; thence N 74° 55′ W 125 feet; thence S 81° 10′ W 94 feet; thence S 56° 35′ W 175 feet more or less to point on line 30 feet from and parallel with center line of track of P. C. C. & St. L. Ry. Co., said parallel line being E of said track; thence northerly 640 feet along said parallel line; thence N 69° 00′ W 110 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence NW 780 feet along said W right-of-way line; thence N 30° 20′ W 140 feet more or less to point on S line of Lot 2975; thence W 40 feet more or less along S line of Lot 2975 to SW corner thereof; thence N 35 feet along W line of Lot 2975; thence N 30° 20′ W 82 feet more or less to point on S line of Lot 2972; thence W 170 feet more or less along S line of Lot 2972 to point on E line of Third Street; thence westerly 60 feet more or less to SE corner of Lot 4179; thence W 108 feet along S line of Lot 4179; thence southwesterly 60 feet more or less to SW corner of Lot 4177; thence southwesterly 72 feet more or less to corner of W line of alley, said corner being W of Lot 4174; thence SW 304 feet along W line of said alley; thence southwesterly 50 feet more or less to corner on E line of said alley; thence SW 680 feet along E line of said alley; thence S 51° 00′ E 98 feet more or less to point on N line of Black Street; thence W 95 feet more or less along N line of Black Street to SW corner of Lot 4135; thence northwesterly 770 feet along a straight line which joins the SW corner of Lot 4135 with the NE corner of the intersection of B Street and Black Street; thence N 30° 15′ E 504 feet; thence N 60° 00′ W 93 feet more or less to point on E line of B Street; thence NE 575 feet along E line of B Street; thence N 61° 00′ W 48 feet more or less to point on W line of B Street; thence NE 42 feet more or less along W line of B Street to point on S line of Gordon Avenue; thence W 30 feet along S line of Gordon Avenue; thence N 2° 00′ E 60 feet more or less to point on N line of Gordon Avenue; thence E 60 feet more or less along N line of Gordon Avenue to point on W line of B Street; thence NE 15 feet along W line of B Street; thence N 16° 50′ W 40 feet; thence northerly 100 feet more or less to SE corner of Lot 14856; thence W 25 feet more or less to SW corner of Lot 14856; thence N 50 feet along W line of Lot 14856; thence northwesterly 155 feet more or less to SE corner of Lot 14868; thence N 30 feet more or less along E line of Lot 14868 to NE corner thereof; thence N 52° 25′ W 285 feet; thence southwesterly 210 feet more or less to NW corner of Lot

15034; thence westerly 90 feet more or less to NW corner of Lot 15037; thence N 68° 50′ E 320 feet; thence S 50° 40′ E 418 feet; thence S 22° 00′ E 190 feet more or less to point on W line of B Street; thence N 165 feet along W line of B Street; thence N 52° 55′ W 320 feet; thence N 51° 35′ W 525 feet; thence N 10° 40′ E 60 feet more or less to point on W line of Kenton Avenue; thence NE 80 feet along W line of Kenton Avenue; thence S 50° 00′ E 50 feet more or less to point on E line of Kenton Avenue; thence SW 18 feet along E line of Kenton Avenue; thence southeasterly 515 feet more or less to NE corner of Lot 15300; thence southeasterly 60 feet more or less to NW corner of Lot 15333; thence southeasterly 110 feet more or less along N line of Lot 15333 to NE corner thereof; thence S 50° 45′ E 140 feet more or less to point on W line of B Street; thence N 100 feet along W line of B Street; thence S 51° 30′ E 50 feet more or less to point on E line of B Street; thence NE 305 feet along E line of B Street; thence N 51° 00′ W 50 feet more or less to point on W line of B Street; thence N 100 feet along W line of B Street; thence N 45° 35′ W 100 feet; thence N 37° 20′ E 20 feet; thence S 57° 50′ E 100 feet more or less to point on W line of B Street; thence N 100 feet along W line of B Street; thence S 51° 00′ E 50 feet more or less to point on E line of B Street; thence NE 785 feet more or less along E line of B Street to point on N corporation line; thence E 690 feet more or less along N corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on W line of Miami Avenue, 100 feet N of N line of Reservoir Street, said distance being measured along said W line of Miami Avenue; thence N 50° 45′ W 160 feet more or less to point on corporation line of the Municipal Corporation of Hamilton; thence NE 115 feet along said corporation line; thence S 47° 55′ E 104 feet; thence N 41° 45′ E 645 feet; thence N 53° 45′ E 148 feet; thence N 62° 50′ E 354 feet; thence N 81° 00′ E 135 feet; thence N 70° 30′ E 840 feet; thence S 19° 30′ E 195 feet; thence N 52° 15′ W 80 feet; thence S 76° 35′ W 428 feet; thence S 57° 20′ W 70 feet; thence N 89° 15′ W 80 feet; thence southwesterly 378 feet more or less to SE corner of Lot 13271, said corner being on W line of Pine Street; thence SW 95 feet more or less along S line of Lot 13271 to SW corner thereof; thence southwesterly 18 feet more or less to SE corner of Lot 13261; thence SW 100 feet more or less along S line of Lot 13261 to SW corner thereof; thence southwesterly 55 feet more or less to SE corner of Lot 13244; thence SW 65 feet along S line of Lot 13244; thence S 48° 30′ W 165 feet more or less to point on E line of Linn Street; thence S 41° 15′ W 370 feet more or less to point on W line of Stout Street; thence SE 25 feet more or less along W line of Stout Street to SE corner of Lot 7195; thence SW 60 feet along S line of Lot 7195; thence S 41° 15′ W 72 feet more or less to point on E line of Lot 7189; thence SE 30 feet more or less along E line of Lot 7189 to SE corner thereof; thence SW 62 feet along S line of Lot 7189; thence southwesterly 122 feet more or less to place of beginning.

Also the following lands within said corporate limits included within the lines described as follow, to-wit:

Beginning at SW corner of Lot 4135, said corner being on N line of

Black Street; thence SE 95 feet along S line of Lot 4135; thence S 36° 00′ W 50 feet more or less to point on S line of Black Street; thence N 61° 30′ W 96 feet; thence S 32° 55′ W 615 feet; thence SW 78 feet more or less to N corner of Lot 234; thence southwesterly 1164 feet more or less to SE corner of Lot 298; thence SW 200 feet more or less along W line of Front Street to SE corner of Lot 294; thence W 35 feet along S line of Lot 294; thence S 33° 50′ W 135 feet; thence S 67° 30′ E 65 feet more or less to point on W line of Front Street; thence SW 88 feet along W line of Front Street; thence N 68° 30′ W 80 feet; thence S 33° 50′ W 390 feet more or less to point on S line of Dayton Street; thence E 28 feet along S line of Dayton Street; thence S 21° 50′ W 50 feet; thence S 68° 30′ E 25 feet; thence S 21° 50′ W 50 feet more or less to point on S line of Lot 132; thence W 70 feet along S line of Lot 132; thence S 33° 50′ W 335 feet more or less to point on W line of N Monument Avenue; thence SW 135 feet more or less along W line of N Monument Avenue to SE corner of Lot 263; thence W 90 feet along S line of Lots 263 and 264; thence S 64° 30′ W 75 feet more or less to point on straight line which joins SW corner of Lot 250 with S corner of Lot 1493, said corner of Lot 1493 being on N line of Main Street; thence northwesterly 545 feet more or less along said straight line to S corner of Lot 1493; thence W 22 feet along SW line of Lot 1493; thence N 41° 20′ E 70 feet; thence N 22° 00′ E 122 feet more or less to point on SW line of Lot 1491; thence NW 24 feet more or less along SW line of Lot 1491 to W corner thereof; thence NE 165 feet more or less along NW line of Lots 1491 and 1490 to N corner of Lot 1490; thence N 33° 40′ E 150 feet more or less to point on N line of Lot 1520; thence NW 30 feet along NE line of Lot 1520; thence N 41° 50′ E 270 feet more or less to point on S line of Wayne Avenue; thence N 32° 50′ E 450 feet more or less to point on NE line of Lot 1860; thence N 34° 40′ E 765 feet more or less to point on NE line of Lot 1882; thence SE 70 feet more or less along NE line of Lot 1882 to E corner thereof; thence N 34° 05′ E 890 feet; thence N 54° 00′ W 45 feet; thence N 15° 20′ E 270 feet; thence N 23° 20′ E 150 feet more or less to point on straight line which joins SW corner of Lot 4135 with NE corner of intersection of B Street and Black Street; thence southeasterly 770 feet more or less along said straight line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at S corner of Lot 1493, said corner being on N line of Main Street; thence SE 545 feet along straight line which joins S corner of Lot 1493 with SW corner of Lot 250; thence S 40° 10′ W 215 feet; thence S 14° 00′ E 95 feet more or less to point on N line of Lot 327; thence E 65 feet more or less along N line of Lot 327 to point on W line of Monument Avenue; thence S 100 feet more or less along W line of Monument Avenue to point on N line of Court Street; thence W 65 feet along N line of Court Street; thence S 37° 35′ W 565 feet more or less to point on S line of Ludlow Street; thence E 20 feet more or less along S line of Ludlow Street to NE corner of Lot 304; thence SW 414 feet more or less along W line of alley to SE corner of Lot 307; thence W 65 feet along S line of Lot 307; thence S 36° 00′ W 175 feet more or less to point on N line of Lot 309; thence E 85 feet more or less along N line of Lot 309 to NE

corner thereof; thence SW 115 feet more or less along E line of Lot 309 to SE corner thereof; thence southwesterly 15 feet more or less to NE corner of Lot 310; thence S 196 feet more or less along E line of Lots 310 and 311 to SE corner of Lot 311; thence W 50 feet along S line of Lot 311; thence southerly 25 feet more or less to NE corner of Out Lot 1; thence southerly 935 feet more or less along W line of Whitman Street to point on N line of Wood Street; thence W 110 feet along N line of Wood Street; thence southerly 60 feet more or less to NE corner of Lot 6799; thence southerly 78 feet more or less along E line of Lot 6799 to point on N line of Chestnut Street; thence southerly 55 feet more or less to NE corner of Lot 4419; thence westerly 645 feet more or less along S line of Chestnut Street and said S line extended to point on W corporation line of the Municipal Corporation of Hamilton; thence northerly 125 feet more or less along said corporation line to point where corporation line turns westerly; thence westerly 160 feet along said corporation line; thence N 16° 30′ E 485 feet; thence northeasterly 540 feet more or less to S corner of Lot 4071; thence NW 80 feet along SW line of Lot 4071; thence northeasterly 170 feet more or less to point where W line of A Street intersects N line of Millikin Street; thence NE 1180 feet more or less along W line of A Street to point on S line of Franklin Street; thence northeasterly 70 feet more or less to W corner of Lot 1765; thence northeasterly 268 feet more or less to N corner of Lot 1499; thence SE 16 feet along NE line of Lot 1499; thence N 41° 30′ E 85 feet more or less to point on S line of Ross Street; thence northerly 70 feet more or less to W corner of Lot 1497; thence northeasterly 265 feet more or less to N corner of Lot 1495; thence SE 50 feet along NE line of Lot 1495; thence N 42° 00′ E 82 feet more or less to point on S line of Main Street; thence SE 35 feet more or less along S line of Main Street to E corner of Lot 1494; thence northeasterly 68 feet more or less to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at NE corner of Lot 4419, said corner being on S line of Chestnut Street; thence southerly 145 feet more or less to NW corner of Lot 4387; thence E 25 feet more or less along N line of Lot 4387 to NE corner thereof; thence S 125 feet more or less along E line of Lot 4387 to SE corner thereof; thence southerly 50 feet more or less to NW corner of Lot 4680; thence E 25 feet more or less along N line of Lot 4680 to NE corner thereof; thence S 100 feet more or less along E line of Lot 4680 to SE corner thereof; thence southerly 15 feet more or less to NW corner of Lot 4668; thence E 30 feet more or less along N line of Lot 4668 to NE corner thereof; thence S 100 feet more or less along E line of Lot 4668 to SE corner thereof; thence southeasterly 40 feet more or less to NE corner of Lot 3842; thence S 110 feet more or less along E line of Lot 3842 to point on N line of Washington Street; thence southerly 40 feet more or less to NW corner of Lot 3858; thence E 60 feet more or less along S line of Washington Street to NE corner of Lot 3859; thence S 190 feet more or less along E line of Lot 3859 to SE corner thereof; thence southeasterly 25 feet more or less to NE corner of Lot 3972; thence southerly 205 feet more or less to NW corner of Lot 3949; thence E 25 feet more or less along N line of Lot 3949 to NE corner thereof; thence S 138 feet more or

less along E line of Lot 3949 to SE corner thereof; thence due S 118 feet more or less to point on N line of Lot 15467; thence E 25 feet more or less along N line of Lot 15467 to NE corner thereof; thence S 122 feet more or less along E line of Lot 15467 to SE corner thereof; thence S 5° 45′ E 195 feet more or less to point on S line of alley; thence E 125 feet more or less along S line of alley to alley corner; thence easterly 90 feet more or less to SE corner of Lot 7003; thence S 515 feet along W line of Front Street; thence due S 170 feet more or less to point on E line of Front Street; thence S 14° 30′ E 210 feet more or less to point on N line of Lot 7228; thence E 135 feet more or less along N line of Lot 7228 to point on W line of George Street; thence S 340 feet along W line of George Street; thence S 21° 45′ E 58 feet; thence N 75° 45′ E 95 feet more or less to point on W line of Lot 7279; thence N 82 feet more or less along W line of Lot 7279 to NW corner thereof; thence E 55 feet more or less along N line of Lots 7279 and 7280 to NE corner of Lot 7280; thence easterly 15 feet more or less to NW corner of Lot 7281; thence E 130 feet more or less along N line of Lots 7281, 7282, 7283, and 7284 to NE corner of Lot 7284; thence easterly 52 feet more or less to NW corner of Lot 7320; thence N 79° 00′ E 145 feet more or less to point on E line of alley; thence N 42 feet more or less along E line of alley to NW corner of Lot 7319; thence E 132 feet more or less along N line of Lot 7319 to point on W line of Bender Street; thence easterly 55 feet more or less to NW corner of Lot 7346; thence E 70 feet along N line of Lot 7346; thence easterly 80 feet more or less to NW corner of Lot 7358; thence easterly 130 feet more or less to NE corner of Lot 7357; thence easterly 70 feet more or less to SW corner of Lot 7376; thence N 30 feet more or less along W line of Lot 7376 to NW corner thereof; thence E 130 feet more or less along N line of Lot 7376 to point on W line of alley; thence northeasterly 34 feet more or less to NW corner of Lot 7389; thence E 80 feet along N line of Lot 7389; thence N 78° 35′ E 100 feet more or less to point on E line of Green Street; thence N 30 feet more or less along E line of Green Street to NW corner of Lot 7465; thence E 120 feet more or less along N line of Lot 7465 to NE corner thereof; thence northeasterly 34 feet more or less to NW corner of Lot 7478; thence E 70 feet along N line of Lot 7478; thence easterly 110 feet more or less to NW corner of Lot 7499; thence E 30 feet along N line of Lot 7499; thence easterly 95 feet more or less to NE corner of Lot 7498; thence easterly 15 feet more or less to SW corner of Lot 7511; thence N 30 feet more or less along W line of Lot 7511 to NW corner thereof; thence E 110 feet along N line of Lot 7511; thence N 78° 45′ E 204 feet more or less to point on E line of alley; thence N 84 feet more or less along E line of alley to point on S line of South Avenue; thence E 464 feet more or less along S line of South Avenue to point on W line of Paoli Avenue; thence S 155 feet more or less along W line of Paoli Avenue to point on N line of alley; thence W 275 feet more or less along N line of alley to point on E line of Peck Avenue; thence N 42 feet along E line of Peck Avenue; thence westerly 65 feet more or less to SE corner of Lot 7532; thence W 25 feet along S line of Lot 7532; thence westerly 125 feet more or less to NE corner of Lot 7534; thence S 30 feet more or less along E line of Lot 7534 to SE corner thereof; thence W 120 feet more or less along S line of Lot 7534 to SW corner thereof; thence S 79° 00′ W 50

feet more or less to point on W line of Cherry Street; thence S 15 feet more or less along W line of Cherry Street to SE corner of Lot 7513; thence W 60 feet along S line of Lot 7513; thence S 79° 00′ W 75 feet more or less to point on W line of alley; thence S 35 feet more or less along W line of alley to SE corner of Lot 7501; thence W 120 feet more or less along S line of Lot 7501 to SW corner thereof; thence westerly 60 feet more or less to SE corner of Lot 7480; thence W 60 feet along S line of Lot 7480; thence westerly 70 feet more or less to NE corner of Lot 7468; thence S 30 feet more or less along E line of Lot 7468 to SE corner thereof; thence W 120 feet more or less along S line of Lot 7468 to SW corner thereof; thence southwesterly 60 feet more or less to SE corner of Lot 7391; thence W 85 feet along S line of Lot 7391; thence southwesterly 65 feet more or less to SE corner of Lot 7378; thence W 40 feet along S line of Lot 7378; thence westerly 160 feet more or less to NE corner of Lot 7360; thence S 26 feet more or less along E line of Lot 7360 to SE corner thereof; thence W 100 feet along S line of Lot 7360; thence S 79° 00′ W 395 feet more or less to point on E line of Lot 7323; thence S 78 feet more or less along E line of Lot 7323 to point on N line of street; thence W 290 feet along N line of street; thence S 87° 50′ W 120 feet; thence S 70° 45′ W 75 feet; thence S 20° 50′ E 1085 feet; thence S 16° 50′ E 215 feet more or less to point on S line of Lot 7581; thence W 280 feet more or less along S line of Lot 7581 and said S line extended to point on W corporation line of the Municipal Corporation of Hamilton; thence northerly 4600 feet more or less along W line of said corporation to point on extended S line of Chestnut Street; thence E 650 feet more or less along said extended S line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point on S line of Lot 7581, 120 feet E of SW corner thereof; thence southeasterly 1200 feet more or less to S corner of Lot 7596, said corner being on W line of Garden Avenue; thence S 15° 15′ E 160 feet more or less to point on W line of Lot 7805; thence SE 715 feet more or less along W line of Lots 7805, 7806, and 7807 to SW corner of Lot 7807; thence southerly 38 feet more or less to NW corner of Lot 8994; thence SE 138 feet more or less along W line of Lots 8994, 8995, 8996, 8997, and 8998 to SW corner of Lot 8998; thence southeasterly 12 feet more or less to NW corner of Lot 8999; thence SE 150 feet more or less along W line of Lots 8999, 9000, 9001, 9002, and 9003 to SW corner of Lot 9003; thence southeasterly 60 feet more or less to NW corner of Lot 9026; thence SE 145 feet more or less along W line of Lot 9026 to SW corner thereof; thence southeasterly 15 feet more or less to NW corner of Lot 9035; thence SE 140 feet more or less along W line of Lot 9035 to SW corner thereof; thence southerly 50 feet more or less to NW corner of Lot 9042; thence S. 130 feet more or less along W line of Lot 9042 to SW corner thereof; thence southerly 15 feet more or less to NW corner of Lot 9048; thence S 130 feet more or less along W line of Lot 9048 to SW corner thereof; thence S 5° 00′ E 200 feet more or less to point on W line of River Street; thence southerly 1895 feet more or less along W line of River Street to point on S corporation line of Municipal Corporation of Hamilton; thence W 400 feet more or less along S line of said corporation to SW corner thereof;

thence northerly 5400 feet more or less along W corporation line to point on extended S line of Lot 7581; thence E 280 feet more or less along said extended S line to place of beginning.

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Heaton Street with W line of Fifth Street; thence S 510 feet more or less along W line of Fifth Street to point on N line of Buckeye Street; thence W 20 feet along N line of Buckeye Street; thence northerly 510 feet more or less along a line parallel with W line of Fifth Street to point on S line of Heaton Street; thence E 20 feet more or less along S line of Heaton Street to place of beginning.

ST. CLAIR TOWNSHIP

(See also "St. Clair and Fairfield Townships" for Fractional Sections 21, 28, and 29 which lie partly in both townships.)

Such lands in T 2 N, R 3 E, 1st P. M., St. Clair Township, are located in Fractional Section 31 as follows:

Fractional Section 31

The following lands in Frac. Sec. 31, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 31 where W line of first highway W of Miami River intersects said S line; thence northerly 500 feet along W line of said highway; thence N 7° 25′ E 590 feet more or less to point on corporation line of Municipal Corporation of Hamilton; thence SE 160 feet more or less along said corporation line to point on center line of Miami River; thence southerly 1025 feet more or less along center line of said river to point on S line of said fractional section; thence W 215 feet more or less along S line of said fractional section to place of beginning.

ST. CLAIR TOWNSHIP

Such lands in T 1 N, R 3 E, 1st P. M., St. Clair Township, are located in Fractional Sections 5, 6, and 8 as follows:

Fractional Section 5

All lands in Frac. Sec. 5, T 1 N, R 3 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 5; thence N 2110 feet along W line of said fractional section; thence S 13° 40′ E 2160 feet more or less to point on S line of said fractional section; thence W 530 feet more or less along S line of said fractional section to place of beginning.

Fractional Section 6

The following lands in Frac. Sec. 6, T 1 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 6, 2110 feet N of SE corner thereof; thence N 16° 00′ W 1660 feet; thence N 4° 25′ W 1025 feet; thence N 5° 25′ E 305 feet; thence N 74° 40′ W 70 feet more or less to point on E line of first highway W of Miami River; thence NE 325 feet

more or less along E line of said highway to point on N line of said fractional section; thence E 180 feet more or less along N line of said fractional section to point on center line of Miami River; thence southerly 1600 feet more or less along center line of Miami River to point on E line of said fractional section; thence S 1720 feet more or less along E line of said fractional section to place of beginning.

Fractional Section 8

All lands in Frac. Sec. 8, T 1 N, R 3 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 8; thence E 535 feet along N line of said fractional section; thence S 3° 45′ E 1035 feet; thence S 22° 45′ E 1240 feet; thence S 51° 25′ W 1445 feet more or less to point on W line of said fractional section; thence N 3070 feet more or less along W line of said fractional section to place of beginning.

ST. CLAIR AND FAIRFIELD TOWNSHIPS

(See also St. Clair Township and Fairfield Township.)

Such lands in T 2 N, R 3 E, 1st P. M., St. Clair and Fairfield Townships, are located in Fractional Sections 21, 28, and 29 as follows:

Fractional Section 21

The following lands in Frac. Sec. 21, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at a point on S line of Frac. Sec. 21 where E line of the first highway W of Miami River intersects S line of said fractional section which point is 620 feet more or less E of SW corner of said fractional section; thence northeasterly 3900 feet along E line of said highway; thence S 26° 25′ E 700 feet; thence S 49° 20′ E 1295 feet; thence S 24° 00′ E 420 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence southwesterly 2015 feet more or less along W right-of-way line of said company to point on S line of said fractional section; thence W 1860 feet more or less along S line of said fractional section to place of beginning.

Fractional Section 28

The following lands in Frac. Sec. 28, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at a point on N line of Frac. Sec. 28, where E line of the first highway W of Miami River intersects N line of said fractional section, which point is 620 feet more or less E of NW corner of said fractional section; thence E 1860 feet more or less along N line of said fractional section to point on W right-of-way line of C. H. & D. Ry. Co.; thence southwesterly 3960 feet more or less along right-of-way line of said company to point on W line of said fractional section; thence N 860 feet more or less along W line of said fractional section to point on E corporation line of the Municipal Corporation of Hamilton; thence northeasterly 710 feet more or less along E line of said corporation to NE corner thereof; thence W 390 feet more or less along N line of said corporation to point

on W line of said fractional section; thence N 1240 feet more or less along W line of said fractional section to point on E line of first highway W of Miami River; thence northeasterly 760 feet more or less along E line of said highway to place of beginning.

Fractional Section 29

The following lands in Frac. Sec. 29, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at a point on E line of Frac. Sec. 29 where N corporation line of the Municipal Corporation of Hamilton intersects said E fractional section line, which point is 1685 feet more or less S of the NE corner of said fractional section; thence W 685 feet more or less along said corporation line to point on E line of first highway W of Miami River; thence northeasterly 1490 feet more or less along E line of said highway to point on E line of said fractional section; thence S 1245 feet more or less along E line of said fractional section to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point where W right-of-way line of C. H. & D. Ry. Co. intersects the E line of Frac. Sec. 29 which point is 3110 feet more or less S of NE corner thereof; thence southwesterly 10 feet along W right-of-way line of said company; thence N 67° 00′ W 235 feet; thence S 27° 15′ W 610 feet; thence S 59° 45′ E 255 feet more or less to point on W right-of-way line of said company; thence northeasterly 340 feet along said W right-of-way line; thence S 64° 00′ E 80 feet more or less to point on line 30 feet from and parallel with center line of track of P. C. C. & St. L. Ry. Co., said parellel line being E of said track; thence southwesterly 590 feet more or less along said parellel line to point on corporation line of the Municipal Corporation of Hamilton; thence westerly 1080 feet more or less along said corporation line to point where said corporation line turns N; thence northeasterly 1800 feet more or less along said corporation line to point on E line of said fractional section; thence S 850 feet more or less along E line of said fractional section to place of beginning.

FAIRFIELD TOWNSHIP

(See also "St. Clair and Fairfield Townships" for Fractional Sections 21, 28, and 29, which lie partly in both townships.)

Such lands in R 3, T 2, M. R's, Fairfield Township, are located in Section 32 and in Fractional Section 33 as follows:

Section 32

The following lands in Sec. 32, R 3, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 32; thence E 450 feet along N line of said section; thence S 25° 40′ E 890 feet more or less to point on corporation line of the Municipal Corporation of Hamilton; thence westerly 1220 feet more or less along said corporation line to point on W line of said section; thence N 1218 feet more or less along W line of said section to place of beginning.

Fractional Section 33

The following lands in Frac. Sec. 33, R 3, T 2, M. R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 33; thence N 655 feet along W line of said fractional section; thence N 53° 20′ E 56 feet; thence S 25° 40′ E 793 feet more or less to point on S line of said fractional section; thence W 450 feet along S line of said fractional section to place of beginning.

FAIRFIELD TOWNSHIP

Such lands in R 2, T 1, M. R's, Fairfield Township, are located in Fractional Sections 5 and 6 as follows:

Fractional Section 5

The following lands in Frac. Sec. 5, R 2, T 1, M. R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 5, 355 feet W of point where W line of first highway E of Miami River intersects said N line; thence S 72° 40′ W 695 feet; thence N 74° 10′ W 1125 feet more or less to point on center line of Miami River; thence easterly 1500 feet more or less along center line of Miami River to point on N line of said fractional section; thence E 300 feet more or less along said N line to place of beginning.

Fractional Section 6

All lands in Fraction Sec. 6, R 2, T 1, M. R's, lying S of S corporation line of the Municipal Corporation of Hamilton and W of W line of first highway E of Miami River, excepting those lands included within the lines described as follows, to-wit:

Beginning at point where W line of first highway E of Miami River intersects S line of Frac. Sec. 6; thence W 355 feet along S line of said fractional section; thence N 46° 00′ E 195 feet more or less to point on S corporation line; thence E 200 feet more or less along said corporation line to point on W line of said highway; thence S 135 feet more or less along said W line of highway to place of beginning.

PROPERTY WITHIN THE DISTRICT TO BE BENEFITED

Lands now within the limits of The Miami Conservancy District, in all cases including all public and private property, rights, franchises, and public utility holdings thereon, that will be benefited by the works of the District are located and described as follows: (Refer to Exhibit No. 17 which is hereby made a part of the following descriptions.)

SHELBY COUNTY

Lands in Shelby County now within the limits of The Miami Conservancy District that will be benefited by the works of the District are located in Washington Township as follows: (Refer to Sheets Nos. 5 and 6 of Exhibit No. 17.)

WASHINGTON TOWNSHIP

Such lands in T 7 N, R 6 E, 1st P. M., Washington Township, are located in Sections 29 and 30 as follows:

Section 29

The following lands in Sec. 29, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 29; thence N 3690 feet along W line of said section; thence N 89° 00′ E 670 feet; thence S 20° 50′ E 2340 feet; thence S 30° 50′ E 1005 feet; thence S 48° 10′ W 900 feet more or less to point on S line of said section; thence W 1300 feet more or less along said S line to place of beginning.

Section 30

The following lands in Sec. 30, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 30, 1700 feet S of NE corner thereof; thence S 980 feet along E line of said section; thence N 23° 30′ W 1050 feet; thence easterly 410 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 30, 2370 feet N of SE corner thereof; thence S 440 feet along E line of said section; thence S 60° 25′ W 240 feet; thence N 11° 45′ W 1030 feet; thence southeasterly 605 feet more or less to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit;

Beginning at SE corner of Sec. 30; thence W 650 feet along S line of said section; thence N 34° 00′ E 1150 feet more or less to point on E line of said section; thence S 920 feet more or less along said E line to place of beginning.

MIAMI COUNTY

Lands in Miami County, now within the limits of The Miami Conservancy District, that will be benefited by the works of the District, are located within the corporate limits of the Municipal Corporations of Troy and Piqua, and in Washington, Spring Creek, Concord, and Staunton Townships, as follows: (Refer to Sheets Nos. 6 to 12 of Exhibit No. 17.)

MUNICIPAL CORPORATION OF PIQUA

The following lands within the corporate limits of the Municipal Corporation of Piqua, included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of E Main Street with W line of Staunton Street; thence S 140 feet along said W line of Staunton Street; thence S 34° 45′ E 80 feet more or less to point on E line of Staunton Street; thence S 750 feet more or less along said E line to point on N line of Third Street; thence S 24° 00′ W 175 feet more or less to point on W line of Staunton Street; thence S 4° 00′ W 630 feet; thence S 4° 15′ E 1125 feet; thence S 21° 55′ W 330 feet more or less to point on corporation line of said corporation; thence W 1075 feet more or less along said corporation line to corporation corner on center line of Miami River; thence southerly 1380 feet more or less along said corporation line to corporation corner; thence W 660 feet more or less along said corporation line to point 255 feet W of W line of S Main Street; thence N 46° 00′ W 1415 feet more or less to point on N line of Clark Avenue; thence W 135 feet more or less along said N line of Clark Avenue to point on center line of roadbed of C. H. & D. Ry. Co.; thence N 1325 feet along center line of said roadbed; thence northeasterly 510 feet more or less to point on W line of Adams Street 300 feet N of N line of Garnsey Street; thence S 62° 00′ E 500 feet; thence N 6° 30′ E 595 feet more or less to point on N line of South Street; thence E 175 feet more or less along said N line of South Street to point on W line of Wayne Street; thence N 2020 feet more or less along said W line of Wayne Street to point on S line of W Main Street; thence W 210 feet along said S line of W Main Street; thence N 1° 30′ W 770 feet more or less to point on S line of High Street; thence W 160 feet more or less along said S line of High Street to point on W line of Downing Street; thence N 80 feet more or less along said W line of Downing Street to point on N line of High Street; thence northwesterly 1210 feet more or less to point of intersection of N line of North Street with W line of Caldwell Street; thence N 12° 40′ W 1955 feet; thence N 35° 10′ W 1240 feet; thence N 53° 50′ W 1200 feet; thence N 39° 10′ W 1210 feet more or less to point on corporation line of said corporation; thence NE 520 feet more or less along said corporation line to corporation corner on center line of Miami River; thence southeasterly 11300 feet more or less along corporation line to point on E bank of Miami River, said point being approximately 100 feet N of right-of-way of P. C. C. & St. L. Ry. Co.; thence E 90 feet more or less along corporation line to point 830 feet W of center line of roadbed of C. H. & D. Ry. Co.; thence S 65° 30′ W 205 feet; thence N 82° 30′ W 1085 feet; thence southerly 320 feet more or less to place of beginning.

MUNICIPAL CORPORATION OF TROY

All lands included within the corporate limits of the Municipal Corporation of Troy lying E of the lines described as follows, to-wit:

Beginning at point on N corporation line of the Municipal Corporation of Troy, 240 feet W of center line of roadbed of C. H. & D. Ry. Co.; thence southerly 1070 feet more or less to point of intersection of S line of highway sometimes known as Covington Road with W line of Western Avenue; thence S 2100 feet more or less along said W line of Western Avenue to point on N line of McKaig Avenue; thence southeasterly 135 feet more or less to point of intersection of S line of McKaig Avenue with W line of Ridge Avenue; thence S 3° 00′ E 1060 feet more or less to point on S line of May Street; thence S 13° 00′ E 1690 feet; thence S 15° 45′ W 760 feet more or less to point on S line of Market Street; thence S 4° 50′ W 550 feet; thence S 61° 45′ W 515 feet; thence S 58° 15′ E 535 feet; thence southerly 785 feet more or less to point on S corporation line of said corporation, 540 feet E of E line of highway sometimes known as Frederick Road.

Excepting those lands within the corporate limits of said municipal corporation, included within the lines described as follows, to-wit:

Beginning at point of intersection of E line of Market Street with S line of Canal Street; thence N 42° 25′ W 975 feet more or less to point on E line of Short Street; thence NE 410 feet along said E line of Short Street; thence S 60° 00′ E 750 feet; thence N 60° 10′ E 355 feet more or less to point on E line of Market Street; thence NE 145 feet along said E line of Market Street; thence S 60° 00′ E 610 feet more or less to point on E line of Mulberry Street; thence N 71° 15′ E 170 feet more or less to point on N line of Water Street; thence SE 1280 feet along said N line of Water Street; thence S 27° 55′ E 865 feet more or less to point on N line of Main Street; thence SE 1220 feet more or less along said N line of Main Street to point on E corporation line of said municipal corporation; thence S 2820 feet more or less along said corporation line to corporation corner; thence W 640 feet along S corporation line; thence N 9° 50′ E 375 feet; thence N 79° 20′ W 765 feet; thence N 26° 25′ W 700 feet; thence N 7° 40′ E 520 feet; thence S 89° 30′ E 275 feet; thence N 27° 00′ E 890 feet; thence N 3° 40′ E 615 feet; thence N 59° 00′ W 1440 feet more or less to point on W line of Union Street; thence S 38° 05′ W 220 feet more or less to point on S line of Canal Street; thence NW 1525 feet more or less along said S line of Canal Street to place of beginning.

Excepting also those lands within the corporate limits of said municipal corporation, included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Market Street with N line of Simpson Street; thence SE 1255 feet more or less along said N line of Simpson Street to point on W line of Crawford Street; thence NE 500 feet along said W line of Crawford Street; thence S 36° 10′ E 1405 feet; thence S 1° 50′ W 700 feet; thence S 20° 30′ E 1560 feet more or less to point on S corporation line of said municipal corporation; thence W 1785 feet along said S corporation line; thence N 41° 00′ W 1250 feet; thence N 3° 00′ W 1375 feet; thence N 73° 00′ W 225 feet; thence northerly 730 feet more or less to point of intersection of S line of Raper Street with W line of Market Street; thence NE 450 feet more or less along said W line of Market Street to place of beginning.

WASHINGTON TOWNSHIP

Such lands in T 7 N, R 6 E, 1st P. M., Washington Township, are located in Fractional Sections 31 and 32 as follows:

Fractional Section 31

The following lands in Frac. Sec. 31, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 31; thence S 4570 feet more or less along E line of said fractional section to point on center line of Miami River; thence southerly 1040 feet more or less along center line of said river to point on S line of said fractional section; thence W 1270 feet more or less along said S line to point 3475 feet E of SW corner thereof; thence N 45° 30′ E 2250 feet more or less to point on W bank of M. & E. Canal; thence northerly 1800 feet more or less along said W bank of canal to point 2110 feet S and 170 feet more or less W of NE corner of said fractional section; thence S 82° 00′ W 935 feet; thence N 0° 20′ E 350 feet; thence N 80° 00′ E 520 feet; thence N 2° 00′ E 1780 feet more or less to point on N line of said fractional section; thence E 515 feet more or less along said N line to place of beginning.

Fractional Section 32

The following lands in Frac. Sec. 32, T 7 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 32; thence E 1300 feet along N line of said fractional section; thence S 10° 40′ E 1580 feet; thence S 81° 30′ W 530 feet; thence S 6° 00′ W 1600 feet more or less to point on center line of Miami River; thence southwesterly 1640 feet more or less along center line of said river to point on W line of said fractional section; thence N 4570 feet more or less along said W line to place of beginning.

WASHINGTON TOWNSHIP

Such lands in T 8 N, R 5 E, 1st P. M., Washington Township, are located in Section 1 as follows:

Section 1

The following lands in Sec. 1 ,T 8 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 1, 2600 feet N of SE corner thereof; thence S 1385 feet along said E line; thence N 46° 25′ W 550 feet; thence N 21° 30′ W 1450 feet; thence N 69° 20′ E 430 feet; thence southeasterly 700 feet more or less to place of beginning.

WASHINGTON TOWNSHIP

Such lands in T 6 N, R 6 E, 1st P. M., Washington Township, are located in Fractional Sections 6, 7, 20, 29, and 32 as follows:

Fractional Section 6

The following lands in Frac. Sec. 6, T 6 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Frac. Sec. 6 with E line of first highway W of Miami River; thence N 710 feet along E line of said

highway; thence N 46° 05′ W 715 feet more or less to point on W line of said fractional section; thence N 1400 feet along said W line; thence S 65° 00′ E 760 feet; thence N 5° 50′ W 880 feet; thence N 31° 45′ E 780 feet; thence N 74° 35′ E 1040 feet; thence N 38° 35′ E 1335 feet; thence N 7° 50′ W 420 feet more or less to point on N line of said fractional section; thence E 1900 feet more or less along said N line to point on center line of Miami River; thence southerly 7390 feet more or less along center line of said river to point on S line of said fractional section; thence W 350 feet more or less along said S line to place of beginning.

Fractional Section 7

All lands in Frac. Sec. 7, T 6 N, R 6 E, 1st P. M., lying E of E line of first highway W of Miami River, excepting those lands included within the corporate limits of the Municipal Corporation of Piqua.

Fractional Section 20

The following lands in Frac. Sec. 20, T 6 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 20, 810 feet E of SW corner thereof; thence N 1° 30′ W 1115 feet; thence N 14° 30′ W 1235 feet; thence N 89° 40′ E 360 feet; thence N 34° 40′ W 660 feet more or less to point on corporation line of the Municipal Corporation of Piqua; thence E 560 feet along said corporation line to point on center line of Miami River; thence southerly 2910 feet more or less along center line of said river to point on S line of said fractional section; thence W 510 feet more or less along said S line to place of beginning.

Fractional Section 29

The following lands in Frac. Sec. 29, T 6 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 29, 810 feet E of NW corner thereof; thence E 510 feet more or less along said N line to point on center line of Miami River; thence southerly 5120 feet more or less along center line of said river to point on S line of said fractional section; thence W 280 feet more or less along said S line to point on W right-of-way line of D. & T. El. Ry. Co.; thence N 3600 feet along said W right-of-way line; thence northerly 1500 feet more or less to place of beginning.

Fractional Section 32

All lands in Frac. Sec. 32, T 6 N, R 6 E, 1st P. M., lying E of W right-of-way line of D. & T. El. Ry. Co.

SPRING CREEK TOWNSHIP

Such lands in R 12, T 1, M.R's, Spring Creek Township, are located in Fractional Sections 25, 31, 32, and 33 as follows:

Fractional Section 25

The following lands in Frac. Sec. 25, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 25, 4295 feet S of NW corner thereof; thence S 58° 00′ E 2140 feet more or less to point on S line of said

fractional section; thence W 420 feet more or less along said S line to point on center line of Miami River; thence westerly 1540 feet more or less along center line of said river to point on W line of said fractional section; thence N 760 feet more or less along said W line to place of beginning.

Fractional Section 31

The following lands in Frac. Sec. 31, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 31, 3475 feet W of NE corner thereof; thence S 21° 20′ E 755 feet; thence S 32° 45′ E 800 feet more or less to point on E line of NW ¼ of said fractional section; thence S 1050 feet more or less along said E line to point on E bank of Miami River; thence southerly 1800 feet more or less along E bank of said river to point on N line of S ½ of SE ¼ of said fractional section; thence E 1800 feet more or less along said N line to point 190 feet W of E line of said fractional section; thence S 25° 50′ E 385 feet more or less to point on E line of said fractional section; thence S 755 feet more or less along said E line to point on center line of Miami River; thence northerly 8350 feet more or less along center line of said river to point on N line of said fractional section; thence E 2430 feet more or less along said N line to place of beginning.

Fractional Section 32

The following lands in Frac. Sec. 32, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 32, 3470 feet W of NE corner thereof; thence S 21° 55′ W 2610 feet; thence S 2° 30′ E 1980 feet; thence S 21° 20′ E 1110 feet more or less to point on S line of said fractional section; thence W 2430 feet more or less along said S line to point on center line of Miami River; thence northerly 6765 feet more or less along center line of said river to point on N line of said fractional section; thence E 380 feet more or less along said N line to place of beginning.

Fractional Section 33

All lands in Frac. Sec. 33, R 12, T 1, M.R's. excepting those lands included within the lines described as follows, to-wit:

Beginning at SE corner of said fractional section; thence W 3375 feet along S line of said fractional section; thence N 44° 40′ E 1180 feet more or less to point on E line of SW ¼ of said fractional section; thence N 380 feet more or less along E line of said SW ¼ to intersection with S line of N ½ of said SE ¼; thence E 320 feet more or less along said S line of N ½ ot SE ¼ to point on W line of first highway E of Miami River; thence NE 2240 feet more or less along W line extended of said highway to point on center line of Miami River; thence southeasterly 770 feet more or less along center line of said river to point on E line of said fractional section; thence S 1965 feet more or less along said E line to place of beginning.

SPRING CREEK TOWNSHIP

Such lands in R 11, T 1, M.R's, Spring Creek Township, are located in Fractional Sections 29, 30, and 35 as follows:

Fractional Section 29

The following lands in Frac. Sec. 29, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 29; thence E 780 feet along N line of said fractional section; thence S 3° 45′ W 5165 feet more or less to point on S line of said fractional section; thence W 375 feet more or less along said S line to point on center line of Miami River; thence northerly 3530 feet more or less along center line of said river to point on W line of said fractional section; thence N 1680 feet more or less along said W line to place of beginning.

Fractional Section 30

The following lands in Frac. Sec. 30, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 30, 400 feet W of W right-of-way line of C. H. & D. Ry. Co.; thence S 58° 00′ E 585 feet more or less to point on said W right-of-way line; thence S 670 feet along said W right-of-way line; thence S 25° 30′ W 1045 feet more or less to point on corporation line of Municipal Corporation of Piqua; thence W and N 2670 feet more or less along said corporation line to point on N line of said fractional section; thence E 420 feet more or less along said N line to place of beginning.

Fractional Section 35

All lands in Frac. Sec. 35, R 11, T 1, M.R's, excepting those lands included within the corporate limits of the Municipal Corporation of Piqua.

CONCORD TOWNSHIP

Such lands in T 5 N, R 6 E, 1st P. M., Concord Township, are located in Fractional Sections 4, 5, 9, 16, 21, 27, and 34 and in Section 33, as follows:

Fractional Section 4

All lands in Frac. Sec. 4, T 5 N, R 6 E, 1st P. M.

Fractional Section 5

All lands in Frac. Sec. 5, T 5 N, R 6 E, 1st P. M., lying E of E right-of-way line of D. & T. El. Ry. Co.

Fractional Section 9

All lands in Frac. Sec. 9, T 5 N, R 6 E, 1st P. M.

Fractional Section 16

All lands in Frac. Sec. 16, T 5 N, R 6 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 21

All lands in Frac. Sec. 21, T 5 N, R 6 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co., excepting those lands included within the corporate limits of the Municipal Corporation of Troy.

Fractional Section 27

All lands in E ½ of Frac. Sec. 27, T 5 N, R 6 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at point on W line of E ½ of said fractional section, 115 feet N of S ¼ corner; thence N 3070 feet along said W line of E ½; thence S 34° 50′ E 1600 feet; thence S 20° 25′ E 1980 feet more or less to point on S line of said fractional section; thence W 1240 feet along said S line; thence N 11° 00′ E 330 feet; thence N 53° 35′ W 290 feet; thence southwesterly 410 feet more or less to place of beginning.

Section 33

The following lands in Sec. 33, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 33, 1190 feet E of NW corner thereof; thence E 3155 feet along said N line; thence S 22° 40′ E 1975 feet; thence S 3° 25′ W 480 feet; thence N 38° 30′ W 1410 feet; thence S 6° 45′ E 1500 feet more or less to point on S line of N ½ of said section; thence W 1205 feet along said S line of N ½; thence N 4° 30′ W 465 feet; thence N 85° 20′ W 985 feet; thence N 39° 15′ W 720 feet; thence N 6° 25′ W 1240 feet; thence northwesterly 525 feet more or less to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 5 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 34, 1025 feet E of NW corner thereof; thence E 1860 feet along said N line; thence S 28° 05′ W 700 feet; thence S 84° 35′ E 335 feet; thence S 6° 30′ E 1015 feet; thence S 33° 00′ E 630 feet; thence S 68° 35′ E 510 feet; thence S 86° 30′ W 1290 feet; thence N 12° 30′ W 725 feet; thence S 44° 40′ W 1560 feet; thence N 4° 55′ W 915 feet; thence N 30° 15′ E 720 feet; thence N 0° 35′ E 670 feet; thence northwesterly 875 feet more or less to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 11, T 1, M.R's, Staunton Township, are located in Fractional Sections 19, 20, 26, 27, and 28 and in Section 21 as follows:

Fractional Section 19

All lands in Frac. Sec. 19, R 11, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at NE corner of said fractional section; thence S 2400 feet more or less along E line of said fractional section to point on W right-of-way line of C. H. & D. Ry. Co.; thence N 470 feet along said W right-of-way line; thence N 86° 00′ W 295 feet; thence N 24° 50′ W 1655 feet; thence N 52° 45′ W 860 feet more or less to point on N line of said fractional section; thence E 1860 feet more or less along said N line to place of beginning.

Excepting also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on E line of said Frac. Sec. 19, 2590 feet N of SE corner thereof; thence S 1660 feet along said E line; thence N 17° 45′ W 1510 feet; thence easterly 575 feet more or less to place of beginning.

Fractional Section 20

The following lands in Frac. Sec. 20, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 20; thence E 915 feet along N line of said fractional section; thence S 29° 30′ E 2230 feet; thence S 17° 50′ E 2070 feet; thence S 7° 00′ E 1550 feet more or less to point on S line of said fractional section; thence W 1765 feet more or less along said S line to point on center line of Miami River; thence northerly 3080 feet more or less along center line of said river to point on W line of said fractional section; thence N 2610 feet more or less along said W line to place of beginning.

Section 21

The following lands in Sec. 21, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 21; thence N 1415 feet along W line of said section; thence S 29° 30′ E 1680 feet more or less to point on S line of said section; thence W 920 feet more or less along said S line to place of beginning.

Fractional Section 26

All lands in Frac. Sec. 26, R 11, T 1, M.R's.

Fractional Section 27

The following lands in Frac. Sec. 27, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 27, 2500 feet W of NE corner thereof; thence S 34° 55′ E 1320 feet; thence S 21° 40′ E 1000 feet; thence S 29° 30′ E 2270 feet more or less to point on E line of said fractional section; thence S 1415 feet more or less along said E line to SE corner of said fractional section; thence W 785 feet more or less along said S line to point on center line of Miami River; thence northerly 6320 feet more or less along center line of said river to point on N line of said fractional section; thence E 865 feet more or less along said N line to place of beginning.

Fractional Section 28

The following lands in Frac. Sec. 28, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 28, 4450 feet W of NE corner thereof; thence S 2° 30′ E 3275 feet; thence S 34° 55′ E 2590 feet more or less to point on S line of said fractional section; thence W 865 feet more or less along said S line to point on center line of Miami River; thence northerly 5680 feet more or less along center line of said river to point on N line of said fractional section; thence E 380 feet more or less along said N line to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 10, T 1, M.R's, Staunton Township, are located in Fractional Sections 9, 10, 11, 17, 23, and 24 and in Sections 3 and 4 as follows:

Section 3

The following lands in Sec. 3, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 3; thence E 980 feet along N line of said section; thence S 11° 05′ E 535 feet; thence S 25° 40′ W 650 feet; thence S 89° 50′ E 725 feet; thence N 41° 00′ E 1370 feet more or less to point on N line of said section; thence E 460 feet along said N line; thence S 53° 25′ W 950 feet; thence S 27° 50′ W 1075 feet; thence S 42° 55′ E 1495 feet more or less to point on S line of N ½ of said section; thence W 940 feet more or less along said S line of N ½ to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence NW 2390 feet more or less along said N right-of-way line to point on W line of said section; thence N 1155 feet more or less along said W line to place of beginning.

Section 4

The following lands in Sec. 4, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 4; thence N 2610 feet along W line of said section to W ¼ corner; thence S 36° 30′ E 840 feet; thence S 3° 00′ W 1000 feet; thence S 19° 30′ E 1060 feet more or less to point on S line of said section; thence W 980 feet more or less along said S line to place of beginning.

Fractional Section 9

The following lands in Frac. Sec. 9, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 9; thence S 1155 feet more or less along E line of said fractional section to point on N right-of-way line of C C. C. & St. L. Ry. Co.; thence NW 800 feet along said N right-of-way line; thence N 6° 25′ E 650 feet more or less to point on N line of said fractional section; thence E 600 feet more or less along said N line to place of beginning.

Fractional Section 10

The following lands in Frac. Sec. 10, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 10, 2420 feet W of NE corner thereof; thence E 775 feet along said N line; thence S 1° 30′ E 595 feet; thence S 21° 35′ E 1595 feet; thence S 56° 35′ E 1040 feet more or less to point on E line of said fractional section; thence S 305 feet along said E line; thence N 52° 40′ W 1105 feet; thence N 25° 25′ W 1445 feet; thence S 4° 00′ W 560 feet; thence S 82° 30′ W 760 feet; thence northerly 1690 feet more or less to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 10; thence W 520 feet along S line of said fractional section; thence N 0° 30′ W 940 feet; thence N 39° 35′ W 1095 feet; thence N 1° 30′ E 1540 feet; thence S 41° 45′ E 1980 feet more or less to point on E line of said fractional section; thence S 1890 feet more or less along said E line to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 10, 3815 feet W of NE corner thereof; thence E 1105 feet along said N line; thence S 32° 05′ W 985 feet; thence N 72° 00′ W 1215 feet; thence northeasterly 785 feet more or less to place of beginning.

Fractional Section 11

All lands in W ½ of Frac. Sec. 11, R 10, T 1, M.R's, lying S and W of W line of first highway E of Miami River.

Also the following lands in said fractional section, included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 11, 595 feet S of NW corner thereof; thence S 47° 00′ E 715 feet; thence S 64° 40′ W 640 feet more or less to point on W line of said fractional section; thence N 750 feet more or less along said W line to place of beginning.

Fractional Section 17

The following lands in Frac. Sec. 17, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 17; thence S 69° 45′ E 625 feet; thence S 7° 20′ W 415 feet; thence S 40° 30′ E 520 feet; thence S 54° 00′ E 1130 feet more or less to point on center line of highway; thence southerly 1175 feet more or less along center line of said highway to point on center line of Miami River; thence northwesterly 1390 feet more or less along center line of said river to point on W line of said fractional section; thence N 2030 feet more or less along said W line to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 17; thence S 3150 feet more or less along E line of said fractional section to point on center line of Miami River; thence westerly 3240 feet more or less along center line of said river to point on center line of main line roadbed of C. H. & D. Ry. Co.; thence northerly 1100 feet more or less along center line of said main line roadbed to point on S line of highway sometimes known as Troy and Piqua Turnpike; thence E 2470 feet along S line of said highway; thence N 29° 30′ W 2715 feet more or less to point on N line of said fractional section; thence E 1760 feet more or less along said N line to place of beginning.

Fractional Section 23

All lands in Frac. Sec. 23, R 10, T 1, M.R's.

Fractional Section 24

All lands in Frac. Sec. 24, R 10, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at NE corner of said fractional section; thence S 4970 feet along E line of said fractional section; thence N 37° 40′ W 560 feet; thence N 12° 55′ W 3140 feet; thence N 58° 30′ E 1000 feet; thence N 15° 00′ E 715 feet; thence northeasterly 450 feet more or less to place of beginning.

MONTGOMERY COUNTY

Lands in Montgomery County, now within the limits of The Miami Conservancy District, that will be benefited by the works of the District, are located within the corporate limits of the Municipal Corporations of Dayton, West Carrollton, Miamisburg, and Germantown, and in Wayne, Mad River, Butler, Randolph, Harrison, Van Buren, Jefferson, Miami, and German Townships as follows: (Refer to Sheets Nos. 13 to 42, also 46 and 47 of Exhibit No. 17.)

MUNICIPAL CORPORATION OF DAYTON

(The corporation has been divided, for convenience of reference, into six divisions.)

First Division

The following lands within the corporate limits of the Municipal Corporation of Dayton, included within the lines described as follows, to-wit:

Beginning at point of intersection of center line of Miami River with N corporation line of the Municipal Corporation of Dayton; thence E along said corporation line to corporation corner; thence northerly along said corporation line to corporation corner on S bank of old channel of Miami River; thence easterly along said corporation line to corporation corner on said S bank of old river channel; thence E along said corporation line to point 1775 feet E of E line of Troy Pike; thence S 74° 40′ W 400 feet; thence N 86° 35′ W 450 feet; thence S 58° 10′ W 660 feet; thence S 15° 00′ E 320 feet more or less to point on S line of Leo Street; thence E 275 feet along S line of Leo Street; thence S 33° 05′ W 380 feet; thence S 1° 10′ W 210 feet; thence S 53° 40′ W 400 feet more or less to point on W line of alley between Grove Avenue and Notre Dame Avenue; thence S 720 feet along said W line of alley; thence S 58° 10′ W 110 feet; thence S 8° 50′ W 415 feet more or less to point on E line of Grove Avenue; thence S 455 feet more or less along extended E line of Grove Avenue to point on S line of Hart Street; thence S 75° 20′ E 710 feet; thence S 65° 00′ E 495 feet; thence N 50° 05′ E 695 feet; thence N 29° 20′ E 170 feet; thence N 50° 00′ E 200 feet; thence N 25° 50′ E 355 feet; thence N 42° 30′ E 610 feet; thence N 69° 10′ E 695 feet; thence N 37° 35′ E 565 feet; thence N 67° 20′ W 720 feet more or less to point on E line of Brandt Pike; thence N 235 feet along E line of Brandt Pike; thence S 76° 20′ E 430 feet more or less to point on S line of Stegman Avenue; thence N 37° 05′ E 625 feet more or less to point on N line of Bickmore Avenue; thence W 550 feet more or less along N line of Bickmore Avenue to point on E line of Brandt Pike; thence S 88° 15′ W 350 feet; thence S 32° 45′ W 335 feet; thence S 28° 30′ E 200 feet; thence S 28° 15′ W 540 feet; thence N 77° 30′ W 540 feet; thence N 9° 45′ W 120 feet; thence NE 285 feet more or less to point where N line of Leo Street intersects E line of Wall Street; thence W 245 feet along N line of Leo Street; thence N 9° 00′ E 765 feet more or less to point on N corporation line; thence E along said corporation line to corporation corner; thence S and W along said corporation line to point on center line of Mad River; thence westerly along center line of Mad River to point on center line of Miami River; thence northerly along center line of Miami River to place of beginning.

Second Division

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point where E line of Salem Avenue intersects S line of River Street; thence N 2° 55′ E 135 feet; thence N 46° 00′ E 315 feet; thence N 28° 50′ W 285 feet; thence N 53° 05′ E 85 feet; thence S 41° 30′ E 235 feet; thence N 51° 55′ E 445 feet; thence S 60° 30′ E 70 feet more or less to point on S line of River Street; thence NE 600 feet along S line of River Street; thence N 11° 30′ W 85 feet; thence N 37° 00′ E 135 feet; thence N 0° 50′ W 365 feet; thence N 42° 30′ W 265 feet; thence N 50° 00′ E 155 feet; thence N

38° 30′ W 500 feet; thence N 16° 00′ E 270 feet; thence N 55° 40′ W 225 feet more or less tb point on S line of Forrer Place; thence N 7° 00′ W 925 feet; thence westerly 150 feet more or less to point where E line of Squirrel Road intersects S line of Five Oaks Avenue; thence northerly 90 feet more or less to point where E line of Squirrel Road intersects N line of Five Oaks Avenue; thence N 10° 30′ E 575 feet more or less to point on N line of Homewood Avenue; thence W 165 feet more or less along said N line of Homewood Avenue to E line of Squirrel Road; thence N 45° 00′ W 190 feet; thence N 3° 30′ W 795 feet; thence N 6° 25′ E 330 feet; thence N 49° 50′ E 480 feet; thence N 46° 40′ W 170 feet; thence N 9° 10′ E 325 feet; thence N 73° 30′ W 130 feet; thence N 0° 30′ E 410 feet more or less to point on S line of Mary Avenue; thence N 78° 00′ W 350 feet; thence N 50° 30′ E 430 feet more or less to point on E line of Stillwater Avenue; thence N 1500 feet along said E line of Stillwater Avenue; thence northerly 435 feet more or less to point where W line of Stillwater Avenue intersects S line of Reasor Street; thence S 83° 45′ W 355 feet; thence N 15° 25′ W 80 feet; thence N 82° 10′ E 290 feet; thence N 30° 30′ W 200 feet; thence S 83° 00′ W 260 feet more or less to point on S line of Ernst Street; thence N 28° 30′ W 290 feet; thence S 81° 30′ E 390 feet; thence N 0° 10′ W 1240 feet more or less to point on corporation line of Municipal Corporation of Dayton; thence E along said corporation line to corporation corner on E bank of Stillwater River; thence S along said corporation line to corporation corner on E bank of Stillwater River; thence westerly along said corporation line to corporation corner on W bank of Stillwater River; thence southerly along said corporation line to point on center line of Miami River; thence southerly along center line of said river to point on extended E line of Salem Avenue; thence NW along said extended E line of Salem Avenue to place of beginning.

Excepting the following lands included within the lines described as follows, to-wit:

Beginning at point where S line of Mumma Avenue intersects W line of Stillwater Avenue; thence S 460 feet along W line of Stillwater Avenue; thence S 0° 30′ W 1050 feet; thence southwesterly 130 feet more or less to point where W line of Geyer Avenue intersects W line of driveway; thence S 2° 30′ E 325 feet; thence S 79° 30′ W 280 feet; thence N 12° 30′ W 1420 feet; thence northeasterly 550 feet more or less to place of beginning.

Third Division

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point of intersection of center line of Wolf Creek with extended S line of first alley N of Hoover Avenue; thence northeasterly 380 feet more or less to point S 87° 10′ W 1695 feet from point where E line of Yuncker Avenue intersects N line of River Street; thence N 87° 10′ E 1695 feet to point where N line of River Street intersects E line of Yuncker Avenue; thence N 77° 10′ E 650 feet more or less to point on W line of Euclid Avenue; thence S 87° 10′ E 625 feet more or less to point on W line of Summit Street; thence S 73° 00′ E 715 feet more or less to point on S line of alley; thence S 12° 40′ E 540 feet; thence N 88° 40′ E 1210 feet; thence N 1° 35′ E 315 feet; thence N 88° 35′ E 90 feet; thence due S 460 feet more or less to point on S line of River Street; thence E 910 feet more or less along extended S line of River Street to point on W line of Orth Avenue; thence

N 120 feet more or less along extended W line of Orth Avenue to point on N line of River Street; thence E 420 feet more or less along said N line of River Street to point on W line of first alley E of Dayton Avenue; thence S 58° 40′ E 60 feet more or less to point on S line of River Street; thence N 73° 00′ E 380 feet; thence NE 455 feet more or less to point where S line of River Street intersects E line of Salem Avenue; thence SE along E line of Salem Avenue extended to point on center line of Miami River; thence southerly along center line of said river to point of intersection with center line of Wolf Creek; thence westerly along said center line of Wolf Creek to place of beginning.

Fourth Division

Also the following lands within the said corporate limits, included within the lines described as follows, to-wit:

Beginning at point of intersection of center line of Mad River with corporation line of the Municipal Corporation of Dayton; thence southerly and easterly along said corporation line to point of intersection with center line of roadbed of C. H. & D. Ry. Co.; thence northwesterly 1485 feet more or less along center line of said roadbed to point of intersection with N line of Springfield Pike; thence SW 800 feet more or less along said N line of Springfield Pike to point on W bank of Hydraulic Canal; thence westerly along W bank of said canal to point on S line of Springfield Pike; thence northerly 55 feet more or less to point where N line of Springfield Pike intersects E line of Burlington Street; thence S 80° 50′ W 1480 feet; thence N 70° 15′ W 500 feet; thence N 87° 55′ W 480 feet; thence S 82° 25′ W 770 feet; thence S 48° 30′ W 220 feet; thence S 70° 15′ W 400 feet; thence S 13° 30′ E 725 feet; thence N 79° 10′ E 160 feet; thence S 5° 00′ E 320 feet; thence S 62° 00′ E 410 feet; thence S 77° 50′ W 460 feet; thence S 4° 00′ E 605 feet; thence S 13° 45′ E 370 feet more or less to point on S line of Fifth Street; thence W 120 feet more or less along S line of Fifth Street to point on W line of High Street; thence S 130 feet along said W line of High Street; thence S 80° 00′ W 245 feet; thence southerly 680 feet more or less to point where S line of McLain Street intersects E line of Quitman Street; thence S 30° 45′ W 610 feet; thence S 82° 00′ E 130 feet; thence S 23° 15′ W 700 feet more or less to point where S line of Hickory Street intersects W line of Wayne Avenue; thence NW along W line of Wayne Avenue extended to point on center line of Miami River; thence easterly along center line of Miami and Mad Rivers to place of beginning.

Fifth Division

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point where W line of Wayne Avenue intersects S line of Hickory Street; thence S 85° 45′ W 205 feet more or less to point on E line of first alley W of Wayne Avenue; thence S 57° 30′ W 685 feet; thence S 48° 15′ W 350 feet; thence S 280 feet more or less to point where S line of Hickory Street intersects W line of first alley W of Bonner Street; thence W 260 feet more or less along said S line of Hickory Street to point on E line of Morton Avenue; thence SE 835 feet more or less along said E line of Morton Avenue to point on N line of Johnson Street; thence N 87° 20′ W 210 feet; thence S 11° 35′ E 390 feet more or less to point on S line of Oak

Street; thence S 33° 15′ W 1055 feet more or less to point on W line of Brown Street; thence northwesterly 755 feet more or less to point where S line of Apple Street intersects W line of first alley W of Brown Street; thence W 1530 feet along said S line of Apple Street; thence S 16° 45′ W 930 feet; thence due S 560 feet more or less to point on E bank of M. & E. Canal; thence southerly 1965 feet more or less along said E bank of canal to point on extended S line of Caldwell Street; thence E 100 feet more or less along said extended S line to point 330 feet from W line of Main Street; thence S 43° 35′ E 425 feet; thence S 22° 15′ E 1205 feet more or less to point on corporation line of said corporation; thence westerly along said corporation line to corporation corner on E line of Cincinnati Street; thence N along said corporation line to point on center line of Miami River; thence northeasterly along center line of said river to point on extended W line of Wayne Avenue; thence SE along said extended W line of Wayne Avenue to place of beginning.

Sixth Division

Also the following lands within said corporate limits, included within the lines described as follows, to-wit:

Beginning at point of intersection of corporation line of the Municipal Corporation of Dayton with center line of Miami River, said point being also on E line of Cincinnati Street; thence NE 2400 feet more or less along said corporation line to corporation corner; thence W 1690 feet more or less along said corporation line to corporation corner on center line of Essex Avenue; thence N 170 feet more or less along said corporation line to corporation corner where center line of Nobel Avenue intersects center line of Essex Avenue; thence W 950 feet more or less along said corporation line to corporation corner where center line of Nobel Avenue intersects center line of Broadway; thence N 140 feet more or less along said corporation line to corporation corner; thence W 1850 feet more or less along said corporation line to corporation corner on center line of Danner Street; thence N 315 feet more or less along said corporation line to corporation corner; thence W 690 feet more or less along said corporation line to corporation corner where S line of Hanna Street intersects W line of Trieschman Avenue; thence N 1005 feet along said corporation line; thence northeasterly 780 feet more or less to point on E line of Danner Street 675 feet N of S line of Hiser Road; thence NE 2080 feet more or less to point where S line of Carnell Street intersects W line of Summit Street; thence NE 495 feet more or less to point where S line of Germantown Pike intersects W line of alley between Summit Street and Greencastle Street; thence N 3° 00′ E 575 feet; thence N 24° 00′ W 455 feet more or less to point on S line of Gordon Avenue; thence N 0° 45′ W 1190 feet more or less to point on N line of Fifth Street; thence N 17° 00′ E 625 feet; thence N 36° 30′ W 495 feet; thence N 8° 00′ W 315 feet; thence N 33° 30′ W 435 feet; thence N 64° 00′ W 1000 feet; thence due W 1670 feet; thence NW 770 feet more or less to point where S line of Michael Avenue intersects W line of Western Avenue; thence N 55° 00′ W 460 feet; thence N 31° 55′ W 455 feet more or less to point on extended S line of first alley N of Hoover Avenue; thence E 155 feet more or less along said extended S line to point on center line of Wolf Creek; thence easterly along center line of Wolf Creek to point on center line of Miami River; thence southerly along center line of said river to place of beginning.

Excepting those lands included within the lines described as follows, to-wit:

Beginning at point where S line of Pontiac Avenue intersects E line of Broadway; thence E 465 feet along S line of Pontiac Avenue; thence southerly 390 feet more or less to point on S line of Bolander Avenue, 55 feet W of W line of Wisconsin Boulevard; thence S 59° 00′ W 1710 feet more or less to point on S line of Hiser Road; thence S 43° 05′ W 565 feet; thence N 14° 10′ W 485 feet more or less to point on N line of Hiser Road; thence northeasterly 1865 feet more or less to place of beginning.

MUNICIPAL CORPORATION OF WEST CARROLLTON

All lands within the corporate limits of the Municipal Corporation of West Carrollton.

MUNICIPAL CORPORATION OF MIAMISBURG

The following lands within the corporate limits of the Municipal Corporation of Miamisburg, included within the lines described as follows, to-wit:

Beginning at point on N corporation line of Municipal Corporation of Miamisburg, 420 feet E of E line of Cincinnati Pike; thence S 22° 15′ W 1075 feet more or less to point on N line of Richard Street; thence S 16° 00′ W 460 feet; thence S 2° 40′ W 620 feet; thence N 30° 25′ E 505 feet; thence S 0° 30′ W 345 feet; thence N 79° 35′ E 255 feet; thence S 54° 00′ W 380 feet more or less to point on N line of Kerchner Street; thence S 9° 00′ E 405 feet more or less to point on S line of Sennett Street; thence S 41° 35′ E 135 feet; thence S 85° 00′ E 125 feet; thence S 66° 25′ E 325 feet; thence S 80° 00′ E 350 feet more or less to point on E line of Ninth Street; thence N 22° 25′ E 205 feet; thence S 84° 25′ E 85 feet; thence N 29° 30′ E 215 feet; thence N 85° 45′ E 130 feet; thence S 18° 10′ W 585 feet; thence S 80° 25′ W 215 feet more or less to point on E line of Ninth Street; thence N 59° 40′ W 60 feet more or less to point on W line of Ninth Street; thence S 55° 50′ W 405 feet; thence S 84° 00′ W 415 feet; thence S 57° 40′ W 380 feet more or less to point on E line of Sixth Street; thence S 430 feet along said E line of Sixth Street; thence S 78° 45′ W 260 feet; thence southwesterly 435 feet more or less to point where N line of Central Avenue intersects W line of Fifth Street; thence S 12° 00′ W 950 feet more or less to point on S line of Linden Avenue; thence southerly 900 feet more or less to point where W line of Fourth Street intersects S line of Lock Street; thence S 20° 35′ W 780 feet; thence S 42° 00′ W 455 feet; thence S 53° 55′ W 445 feet; thence S 70° 30′ W 265 feet more or less to point on corporation line of said corporation; thence W 1100 feet more or less along said corporation line to corporation corner on E bank of Miami River; thence N 1830 feet more or less along said corporation line to corporation corner; thence W 865 feet more or less along said corporation line to corporation corner; thence S 645 feet more or less along said corporation line to corporation corner; thence W 750 feet more or less along said corporation line to corporation corner; thence N 68° 55′ E 130 feet; thence N 20° 35′ E 110 feet; thence N 40° 05′ E 505 feet; thence N 27° 40′ E 450 feet; thence N 44° 20′ E 380 feet more or less to point on S line of Linden Avenue (Wof Miami River); thence N 26° 00′ E 195 feet; thence N 44° 20′ E 230 feet; thence N 33° 10′ E 260 feet; thence

N 13° 20′ E 530 feet; thence northerly 440 feet more or less to corporation corner of said corporation; thence northerly and easterly along said corporation line to place of beginning.

MUNICIPAL CORPORATION OF GERMANTOWN

The following lands within the corporate limits of the Municipal Corporation of Germantown, included within the lines described as follows, to-wit:

Beginning at point on W corporation line of Municipal Corporation of Germantown, 1770 feet S of NW corner of Sec. 13, T 3 N, R 4 E, 1st P. M.; thence S 88° 00′ E 330 feet; thence N 45° 45′ E 945 feet; thence S 84° 30′ E 845 feet; thence N 40° 40′ E 840 feet; thence easterly 715 feet more or less to point where N line of Center Street intersects E line of Walnut Street; thence S 655 feet along E line of Walnut Street; thence northeasterly 1200 feet more or less to point where E line of Cherry Street intersects N line of Market Street; thence N 23° 30′ E 855 feet more or less to point on N line of Warren Street; thence N 10° 20′ E 1350 feet; thence S 47° 10′ E 1075 feet; thence S 1° 50′ E 1385 feet more or less to point on S line of Market Street; thence S 49° 40′ E 980 feet; thence S 10° 40′ W 375 feet; thence S 42° 05′ E 425 feet; thence N 87° 30′ E 525 feet; thence N 67° 20′ E 1290 feet; thence S 81° 00′ E 1010 feet more or less to point on S corporation line of said municipal corporation; thence westerly 10690 feet more or less along said S corporation line to SW corporation corner; thence N 1820 feet more or less along W corporation line to place of beginning.

WAYNE TOWNSHIP

(See also "Mad River and Wayne Townships" for Fractional Section 32 which lies partly in each township.)

Such lands in R 8, T 2, M.R's, Wayne Township, are located in Fractional Sections 33 and 35 and in Section 34 as follows:

Fractional Section 33

All lands in Frac. Sec. 33, R 8, T 2, M.R's, lying W of the E bank of the M. & E. Canal.

Section 34

The following lands in Sec. 34, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 34; thence E 280 feet along N line of said section; thence S 6° 00′ E 655 feet; thence S 28° 50′ E 1460 feet; thence S 13° 00′ W 1335 feet more or less to point on S line of highway; thence E 650 feet along said S line of highway; thence S 56° 40′ E 390 feet; thence S 20° 30′ E 1225 feet; thence S 9° 05′ E 1025 feet more or less to point on S line of said section; thence W 2480 feet more or less along said S line to SW corner of said section; thence N 5500 feet more or less along W line of said section to place of beginning.

Fractional Section 35

The following lands in Frac. Sec. 35, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 35; thence N 3200 feet more or less

along W line of said fractional section to point on center line of Miami River; thence northerly 380 feet more or less along center line of said river to point 3575 feet N and 140 feet more or less E of SW corner of said fractional section; thence S 87° 40′ E 450 feet; thence S 7° 00′ W 1970 feet; thence S 39° 50′ E 655 feet; thence N 87° 40′ W 455 feet; thence S 4° 25′ W 1125 feet more or less to point on S line of said fractional section; thence W 240 feet more or less along said S line to place of beginning.

WAYNE TOWNSHIP

Such lands in R 8, T 1, M.R's, Wayne Township, are located in Fractional Sections 2, 3, 4, and 5 as follows:

Fractional Section 2

All lands in Frac. Sec. 2, R 8, T 1, M.R's.

Fractional Section 3

All lands in Frac. Sec. 3, R 8, T 1, M.R's.

Fractional Section 4

All lands in Frac. Sec. 4, R 8, T 1, M.R's.

Fractional Section 5

All lands in Frac. Sec. 5, R 8, T 1, M.R's.

MAD RIVER AND WAYNE TOWNSHIPS

(Refer also to Mad River Township and Wayne Township.)

Such lands in R 8, T 2, M.R's, Mad River and Wayne Townships, are located in Fractional Section 32 as follows:

Fractional Section 32

All lands in Frac. Sec. 32, R 8, T 2, M.R's, excepting those lands lying E of the E bank of the M. & E. Canal.

BUTLER TOWNSHIP

(See also "Butler and Randolph Townships" for Sections 23, 24, 25, 31, 32, and 36 which lie partly in each township.)

Such lands in T 3 N, R 6 E, 1st P. M., Butler Township, are located in Fractional Sections 23, 26, and 35 as follows:

Fractional Section 23

The following lands in Frac. Sec. 23, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 23, 1480 feet E of SW corner thereof; thence N 54° 55′ E 600 feet; thence N 11° 30′ E 1275 feet; thence southeasterly 1610 feet more or less to point on center line of Miami River 845 feet N and 3660 feet more or less E of SW corner of said fractional section; thence southerly 840 feet more or less along center line of said river to point on S line of said fractional section; thence W 1685 feet more or less along said S line to place of beginning.

Fractional Section 26

The following lands in Frac. Sec. 26, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 26, 1490 feet E of NW corner thereof; thence E 1960 feet more or less along said N line to point on center line of Miami River; thence southerly 6050 feet more or less along center line of said river to point on S line of said fractional section; thence W 270 feet more or less along said S line to point 1310 feet E of SW corner of said fractional section; thence N 3° 40′ E 2380 feet; thence N 16° 50′ E 2465 feet; thence N 7° 00′ W 455 feet; thence northwesterly 780 feet more or less to place of beginning.

Fractional Section 35

The following lands in Frac. Sec. 35, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 35, 1310 feet E of NW corner thereof; thence E 270 feet more or less along said N line to point on center line of Miami River; thence southerly 5660 feet more or less along center line of said river to point on S line of said fractional section; thence W 170 feet more or less along said S line to point 810 feet E of SW corner of said fractional section; thence N 10° 30′ E 1575 feet; thence N 72° 15′ W 435 feet; thence N 20° 50′ E 160 feet; thence N 89° 45′ E 410 feet; thence N 5° 20′ E 1325 feet; thence N 0° 35′ W 1605 feet; thence N 51° 50′ W 430 feet; thence northeasterly 465 feet more or less to place of beginning.

BUTLER AND RANDOLPH TOWNSHIPS

(Refer also to Butler Township and Randolph Township.)

Such lands in T 3 N, R 6 E, 1st P. M., Butler and Randolph Townships, are located in Sections 31 and 32 as follows:

Section 31

The following lands in Sec. 31, T 3 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 31, 580 feet S of the NW corner thereof; thence S 29° 50′ E 760 feet; thence N 55° 20′ E 305 feet; thence N 5° 00′ W 1060 feet; thence S 32° 50′ E 970 feet; thence S 2° 30′ W 1030 feet; thence S 70° 00′ E 1975 feet; thence S 84° 15′ E 2105 feet more or less to point on E line of said section; thence S 2300 feet along said E line; thence N 77° 10′ W 1560 feet; thence N 55° 50′ W 1745 feet; thence S 56° 00′ W 520 feet; thence N 0° 55′ W 525 feet; thence N 61° 30′ W 830 feet; thence N 44° 55′ W 955 feet; thence N 25° 00′ W 420 feet more or less to point on W line of said section; thence N 1460 feet along said W line to place of beginning.

Section 32

All lands in Sec. 32, T 3 N, R 6 E, 1st P. M., lying S and W of the E line of highway sometimes known as Fredericksburg Pike.

BUTLER AND RANDOLPH TOWNSHIPS

(Refer also to Butler Township and Randolph Township.)

Such lands in T 5 N, R 5 E, 1st P. M., Butler and Randolph Townships, are located in Sections 23, 24, 25, and 36 as follows:

Section 23

The following lands in Sec. 23, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 23; thence W 500 along S line of said section; thence N 36° 00′ W 2125 feet; thence N 46° 30′ E 1000 feet; thence N 38° 00′ E 345 feet; thence S 64° 25′ E 715 feet; thence N 89° 05′ W 680 feet; thence S 46° 30′ E 1165 feet more or less to point on E line of said section; thence S 1585 feet more or less along said E line to place of beginning.

Section 24

The following lands in Sec. 24, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 24; thence N 1585 feet along W line of said section; thence S 41° 20′ E 2110 feet more or less to point on S line of said section; thence W 1380 feet more or less along said S line to place of beginning.

Section 25

The following lands in Sec. 25, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 25; thence E 1380 feet along N line of said section; thence S 23° 30′ E 1950 feet; thence S 50° 00′ E 360 feet more or less to point on S line of Lot 22 of the Village of Little York; thence southeasterly 350 feet more or less to SE corner of Lot 12 of said village; thence S 23° 05′ E 1230 feet; thence S 43° 20′ E 2365 feet more or less to point on S line of said section; thence W 1265 feet along said S line; thence N 40° 10′ W 1880 feet; thence N 23° 00′ W 1125 feet; thence N 38° 35′ W 2960 feet more or less to point on W line of said section; thence N 360 feet more or less along said W line to place of beginning.

Section 36

The following lands in Sec. 36, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 36, 545 feet W of the NE corner thereof; thence S 43° 30′ E 795 feet more or less to point on E line of said section; thence S 1460 feet along said E line; thence N 25° 20′ W 520 feet; thence N 51° 00′ W 1250 feet; thence N 40° 10′ W 1010 feet more or less to point on N line of said section; thence E 1265 feet more or less along said N line to place of beginning.

RANDOLPH TOWNSHIP

(See also "Butler and Randolph Townships" for Sections 23, 24, 25, 31, 32, and 36 which lie partly in each township.)

Such lands in T 5 N, R 5 E, 1st P. M., Randolph Township, are located in Section 26 as follows:

Section 26

The following lands in Sec. 26, T 5 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 26; thence S 360 feet along E line of said section; thence N 75° 05′ W 575 feet; thence N 13° 40′ E 215 feet more or

less to point on N line of said section; thence E 500 feet more or less along said N line to place of beginning.

MAD RIVER TOWNSHIP

(See also "Mad River and Wayne Townships" for Fractional Section 32 which lies partly in each township.)

Such lands in R 8, T 2, M.R's, Mad River Township, are located in Sections 13, 19, 25, and 26, and in Fractional Section 31 as follows:

Section 13

The following lands in Sec. 13, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 13; thence W 5375 feet more or less along S line of said section to SW corner thereof; thence N 2035 feet along W line of said section; thence N 69° 15′ E 630 feet; thence S 87° 50′ E 965 feet; thence N 84° 20′ E 3080 feet; thence S 38° 40′ E 1195 feet more or less to point on E line of said section; thence S 2010 feet more or less along said E line to place of beginning.

Section 19

The following lands in Sec. 19, R 8, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 19; thence W 2810 feet along S line of said section; thence N 34° 40′ E 270 feet; thence N 69° 10′ E 1685 feet; thence N 37° 35′ E 990 feet; thence N 69° 15′ E 630 feet more or less to point on E line of said section; thence S 2040 feet more or less along said E line to place of beginning.

Section 25

All lands in Sec. 25, R 8, T 2, M.R's, lying W of the E bank of the M. & E. Canal.

Section 26

All lands in Sec. 26, R 8, T 2, M.R's, lying W of the E bank of the M. & E. Canal.

Fractional Section 31

All lands in Frac. Sec. 31, R 8, T 2. M.R's, lying W of E bank of M. & E. Canal.

MAD RIVER TOWNSHIP

Such lands in R 7, T 2, M.R's, Mad River Township, are located in Sections 18, 23, 24, 29, 30, and 35, and in Fractional Section 36 as follows:

Section 18

The following lands in Sec. 18, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 18; thence E 5375 feet more or less along N line of said section to NE corner thereof; thence S 280 feet more or less along E line of said section to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence southwesterly 3130 feet along said N right-of-way line; thence S 72° 50′ W 1570 feet; thence N 74° 50′ W 445 feet; thence S 62° 45′ W 915 feet more or less to point on W line of said section; thence N 2900 feet more or less along said W line to place of beginning.

Section 23

The following lands in Sec. 23, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 23; thence E 3850 feet along N line of said section; thence S 83° 35′ W 1300 feet; thence S 14° 05′ W 1160 feet; thence S 49° 45′ W 1280 feet; thence S 77° 45′ W 850 feet more or less to point on N right-of-way line of C. H. & D. Ry. Co.; thence northwesterly 510 feet more or less along said right-of-way line to point on corporation line of the Municipal Corporation of Dayton; thence northerly 375 feet more or less along said corporation line to point on W line of said section; thence N 1860 feet more or less along said W line to place of beginning.

Section 24

The following lands in Sec. 24, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 24; thence S 2900 feet along E line of said section; thence S 41° 20′ W 1115 feet; thence S 14° 30′ W 735 feet; thence S 37° 50′ W 970 feet more or less to point on S line of said section; thence W 3850 feet more or less along said S line to SW corner of said section; thence N 3485 feet along W line of said section; thence N 38° 25′ E 660 feet; thence N 69° 20′ E 1885 feet; thence N 34° 40′ E 665 feet more or less to point on N line of said section; thence E 2810 feet more or less along said N line to place of beginning.

Section 29

All lands in Sec. 29, R 7, T 2, M.R's, lying N and E of the corporation line of the Municipal Corporation of Dayton.

Section 30

The following lands in Sec. 30, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 30; thence W 5380 feet more or less along S line of said section to SW corner thereof; thence N 820 feet along W line of said section; thence easterly 885 feet more or less to SW corner of Lot 19 of Semler Subdivision; thence N 76° 10′ E 1245 feet; thence N 45° 20′ E 560 feet; thence N 81° 10′ E 750 feet; thence N 53° 30′ E 2785 feet more or less to point on E line of said section; thence S 3520 feet more or less along said E line to place of beginning.

Section 35

All lands in Sec. 35, R 7, T 2, M.R's, excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Fractional Section 36

The following lands in Frac. Sec. 36, R 7, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 36; thence N 4680 feet more or less along W line of said section to point on center line of Miami River; thence easterly 2500 feet more or less along center line of said river to point on N line of said section; thence E 1490 feet more or less along said N line to point on W line of highway; thence southwesterly 700 feet along said W

line of highway; thence S 53° 30′ W 990 feet; thence S 11° 30′ W 1110 feet; thence S 83° 35′ E 500 feet; thence S 59° 00′ E 945 feet; thence S 19° 40′ W 440 feet; thence S 77° 20′ E 655 feet; thence S 31° 50′ E 1360 feet more or less to point on E line of said section; thence S 890 feet more or less along said E line to SE corner of said section, said corner being on corporation line of the Municipal Corporation of Dayton; thence westerly 5630 feet more or less along said corporation line to place of beginning.

MAD RIVER TOWNSHIP

Such lands in R 7, T 1, M.R's, Mad River Township, are located in Fractional Sections 5, 6, 11, and 12 as follows:

Fractional Section 5

All lands in Frac. Sec. 5, R 7, T 1, M.R's, excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Fractional Section 6

All lands in Frac. Sec. 6, R 7, T 1, M.R's.

Fractional Section 11

All lands in Frac. Sec. 11, R 7, T 1, M.R's, excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Fractional Section 12

All lands in Frac. Sec. 12, R 7, T 1, M.R's.

HARRISON TOWNSHIP

Such lands in T 2 N, R 6 E, 1st P. M., Harrison Township, are located in Sections 4, 5, 8, 9, 11, and 16 and in Fractional Sections 1, 2, 12, 13, 14, 15, 21, and 22 as follows:

Fractional Section 1

All lands in Frac. Sec. 1, T 2 N, R 6 E, 1st P. M.

Fractional Section 2

The following lands in Frac. Sec. 2, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 2; thence W 920 feet along S line of said fractional section; thence N 15° 30′ W 875 feet; thence N 3° 00′ W 2090 feet; thence N 77° 20′ W 135 feet; thence S 34° 45′ W 1035 feet; thence S 67° 20′ W 615 feet; thence N 72° 05′ W 605 feet; thence N 45° 20′ W 1240 feet; thence N 18° 30′ W 1660 feet; thence N 0° 30′ E 775 feet more or less to point on N line of said fractional section; thence E 175 feet more or less along said N line to point on center line of Miami River; thence southerly and easterly 7190 feet more or less along center line of said river to point on E line of said fractional section; thence S 3755 feet more or less along said E line to place of beginning.

Section 4

All lands in Sec. 4, T 2 N, R 6 E, 1st P. M., lying S and W of W line of highway sometimes known as Fredericksburg Pike.

Section 5

The following lands in Sec. 5, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at the SE corner of Sec. 5; thence W 2110 feet along S line of said section; thence N 32° 25′ W 790 feet; thence N 41° 25′ W 2565 feet more or less to point on N line of Lot 75 of Shiloh Place Plat; thence N 35° 50′ W 1450 feet; thence N 5° 35′ W 1355 feet more or less to point on N line of said section; thence E 3050 feet more or less along said N line to point on W line of highway sometimes known as Fredericksburg Pike; thence southeasterly 3030 feet more or less along said W line of highway to point 790 feet NW of intersection of W line of said highway with E line of said section; thence N 89° 50′ W 905 feet; thence S 3° 30′ W 765 feet; thence N 77° 30′ E 1355 feet more or less to point on W line of said highway; thence southeasterly 185 feet more or less along said W line of highway to point on E line of said section; thence S 2130 feet more or less along said E line to place of beginning.

Section 8

The following lands in Sec. 8, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 8; thence S 2330 feet along E line of said section; thence S 83° 05′ W 820 feet; thence N 44° 05′ E 655 feet; thence N 41° 15′ W 2675 feet more or less to point on N line of said section; thence E 2110 feet more or less along said N line to place of beginning.

Section 9

The following lands in Sec. 9, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 9; thence E 2175 feet more or less along N line of said section to point on E line of highway sometimes known as Fredericksburg Pike; thence southeasterly 1920 feet along said E line of highway; thence due S 30 feet more or less to point on W line of said highway; thence S 51° 50′ E 2230 feet more or less to point on E line of said section; thence S 1150 feet along said E line; thence S 67° 50′ W 415 feet; thence S 7° 40′ E 690 feet more or less to point on S line of said section; thence W 3020 feet along said S line; thence N 3° 30′ W 835 feet; thence N 32° 20′ W 1700 feet; thence N 73° 30′ W 895 feet more or less to point on W line of said section; thence N 2330 feet more or less along said W line to place of beginning.

Section 11

The following lands in Sec. 11, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 11; thence S 5230 feet more or less along E line of said section to SE corner thereof; thence W 3715 feet along S line of said section; thence N 24° 45′ E 1260 feet; thence N 48° 45′ E 1110 feet; thence N 22° 25′ E 1625 feet; thence N 12° 20′ W 545 feet; thence N 41° 55′ E 1460 feet more or less to point on N line of said section; thence E 920 feet more or less along said N line to place of beginning.

Fractional Section 12

All lands in Frac. Sec. 12, T 2 N, R 6 E, 1st P. M.

Fractional Section 13

All lands in Frac. Sec. 13, T 2 N, R 6 E, 1st P. M.

Fractional Section 14

The following lands in Frac. Sec. 14, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 14; thence S 2200 feet more or less along E line of said fractional section to point on center line of Miami River; thence westerly 5665 feet more or less along center line of said river to point on W line of said fractional section; thence N 3290 feet along said W line; thence N 66° 00′ E 1070 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 800 feet along said W right-of-way line; thence S 89° 00′ E 485 feet; thence N 8° 50′ E 1160 feet more or less to point on N line of said fractional section; thence E 3715 feet more or less along said N line to place of beginning.

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 15; thence northerly 1105 feet more or less to SW corner of Lot 149 of Garden City Plat; thence northerly 720 feet more or less to NW corner of Lot 139 of said plat; thence E. 230 feet more or less along N line of said Lot 139 to NE corner thereof; thence northerly 715 feet more or less to SW corner of Lot 27 of said plat; thence E 150 feet more or less along S line of said Lot 27 to SE corner thereof; thence N 61° 40′ E 1270 feet; thence N 71° 05′ E 1965 feet; thence N 39° 30 E 1350 feet more or less to point on E line of said fractional section; thence S 3110 feet more or less along said E line to point on center line of Miami River; thence southwesterly 1720 feet more or less along center line of said river to point on S line of said fractional section; thence W 3945 feet more or less along said S line to place of beginning.

Section 16

The following lands in Sec. 16, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 16, 1950 feet E of NW corner thereof; thence E 2915 feet along said N line; thence S 7° 40′ E 760 feet; thence S 55° 15′ W 1755 feet; thence S 1° 20′ W 1020 feet; thence S 10° 15′ E 2730 feet more or less to point on S line of said section; thence W 450 feet more or less along said S line to point on corporation line of the Municipal Corporation of Dayton; thence northerly 175 feet more or less along said corporation line to corporation corner; thence W 480 feet along corporation line; thence northerly 895 feet more or less to SW corner of Lot 204 of Knecht Plat; thence N 14° 30′ W 775 feet; thence S 86° 35′ W 255 feet; thence N 49° 55′ W 250 feet; thence S 89° 30′ E 300 feet; thence N 23° 30′ E 205 feet; thence N 11° 45′ W 1190 feet more or less to point on W line of Lot 217 of Knecht Plat; thence N 35° 30′ W 740 feet; thence N 1° 25′ W 395 feet; thence southeasterly 485 feet more or less to SE corner of Lot 252 of North Riverdale Plat; thence easterly 200 feet more or less to E corner of Lot 248 of said plat; thence northerly 130 feet more or less to the SW

corner of Lot 260 of said plat; thence N 125 feet more or less along W line of said lot to NW corner thereof; thence N 68° 10′ W 140 feet more or less to point on S line of Lot 320 of said plat; thence northerly 580 feet more or less to NW corner of Lot 307 of said plat; thence northerly 820 feet more or less to place of beginning.

Fractional Section 21

The following lands in Frac. Sec. 21, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 21, 1250 feet S of NE corner thereof; thence S 790 feet more or less along said E line to point on center line of Miami River; thence southerly 3450 feet more or less along center line of said river to point on corporation line of Municipal Corporation of Dayton; thence northerly 5990 feet more or less along corporation line to point on N line of said section; thence E 530 feet along said N line; thence S 2° 10′ E 1775 feet; thence S 67° 50′ E 840 feet; thence northerly 950 feet more or less to place of beginning.

Fractional Section 22

All lands in Frac. Sec. 22, T 2 N, R 6 E, 1st P. M.

HARRISON TOWNSHIP

Such lands in T 1 N, R 6 E, 1st P. M., Harrison Township, are located in Sections 4 and 5 and in Fractional Sections 8, 9, 17, and 18 as follows:

Section 4

All lands in Sec. 4, T 1 N, R 6 E, 1st P. M., excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Section 5

The following lands in Sec. 5, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 5; thence W 2305 feet more or less along S line of said section to point on W right-of-way line of C. H. & D. Ry. Co.; thence NW 1910 feet more or less along said W right-of-way line to point on corporation line of Municipal Corporation of Dayton; thence E and S 1320 feet more or less along said corporation line to point on E line of said section; thence S 1400 feet more or less along said E line to place of beginning.

Fractional Section 8

All lands in Frac. Sec. 8, T 1 N, R 6 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 9

All lands in Frac. Sec. 9, T 1 N, R 6 E, 1st P. M., excepting those lands included within the corporate limits of the Municipal Corporation of Dayton.

Fractional Section 17

All lands in Frac. Sec. 17, T 1 N, R 6 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 18

All lands in Frac. Sec. 18, T 1 N, R 6 E, 1st P. M., lying E of W right-of-way of C. H. & D. Ry. Co.

VAN BUREN TOWNSHIP

Such lands in R 7, T 1, M.R's, Van Buren Township, are located in Section 7 and in Fractional Sections 8, 13, and 14 as follows:

Section 7

All lands in Sec. 7, R 7, T 1, M.R's, lying W of E bank of M. & E. Canal.

Fractional Section 8

All lands in Frac. Sec. 8, R 7, T 1, M.R's, lying W of corporation line of Municipal Corporation of Dayton, said corporation line being also E line of highway sometimes known as Cincinnati Pike.

Fractional Section 13

All lands in Frac. Sec. 13, R 7, T 1, M.R's, excepting those lands lying E of E bank of M. & E. Canal.

Fractional Section 14

All lands in Frac. Sec. 14, R 7, T 1, M.R's.

VAN BUREN TOWNSHIP

Such lands in R 6, T 1, M.R's, Van Buren Township, are located in Fractional Sections 17 and 18 as follows:

Fractional Section 17

The following lands in Frac. Sec. 17, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 17, 890 feet more or less W of NE corner thereof, said point being also on E bank of M. & E. Canal; thence southerly 1940 feet more or less along said E bank of M. & E. Canal to point 1700 feet more or less due W and 1640 feet due S of NE corner of said fractional section; thence S 67° 55′ E 710 feet; thence S 18° 40′ W 790 feet; thence S 37° 00′ E 1430 feet more or less to point on E right-of-way line of C. C. C. & St. L. Ry. Co.; thence S 500 feet along said E right-of-way line; thence S 84° 40′ E 290 feet more or less to point on E line of said fractional section; thence S 980 feet more or less along said E line to SE corner of said fractional section; thence W 3895 feet more or less along S line of said fractional section to point on center line of Miami River; thence northerly 5555 feet more or less along center line of said river to point on N line of said fractional section; thence E 2530 feet more or less along said N line to place of beginning.

Fractional Section 18

All lands in Frac. Sec. 18, R 6, T 1, M.R's, lying W of E bank of M. & E. Canal.

JEFFERSON TOWNSHIP

Such lands in T 3 N, R 5 E, 1st P. M., Jefferson Township, are located in Section 26 and in Fractional Sections 24 and 25 as follows:

Fractional Section 24

All lands in Frac. Sec. 24, T 3 N, R 5 E, 1st P. M., lying S of N right-of-way line of C. H. & D. Ry. Co.

Fractional Section 25

All lands in Frac. Sec. 25, T 3 N, R 5 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Section 26

All lands in Sec. 26, T 3 N, R 5 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

MIAMI TOWNSHIP

Such lands in R 6, T 1, M.R's, Miami Township, are located in Section 15 and in Fractional Sections 16, 21, 22, 26, 27, and 28 as follows:

Section 15

All lands in Sec. 15, R 6, T 1, M.R's, lying N of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 16

All lands in Frac. Sec. 16, R 6, T 1, M.R's, lying W of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 21

All lands in Frac. Sec. 21, R 6, T 1, M.R's, lying N of S right-of-way line of C. C. C. & St. L. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of West Carrollton.

Fractional Section 22

All lands in Frac. Sec. 22, R 6, T 1, M.R's.

Fractional Section 26

All lands in Frac. Sec. 26, R 6, T 1, M.R's, lying W of E right-of-way line of C. C. C. & St. L. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of Miamisburg.

Fractional Section 27

All lands in Frac. Sec. 27, R 6, T 1, M.R's, lying N and W of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 28

All lands in Frac. Sec. 28, R 6, T 1, M.R's.

MIAMI TOWNSHIP

Such lands in T 1 N, R 6 E, 1st P. M., Miami Township, are located in Fractional Sections 19, 20, 29, and 30 as follows:

Fractional Section 19

All lands in Frac. Sec. 19, T 1 N, R 6 E, 1st P. M., lying E and S of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 20

All lands in Frac. Sec. 20, T 1 N, R 6 E, 1st P. M.

Fractional Section 29

All lands in Frac. Sec. 29, T 1 N, R 6 E, 1st P. M.

Fractional Section 30

All lands in Frac. Sec. 30, T 1 N, R 6 E, 1st P. M.

MIAMI TOWNSHIP

Such lands in T 3 N, R 5 E, 1st P. M., Miami Township, are located in Fractional Sections 35 and 36 as follows:

Fractional Section 35

All lands in Frac. Sec. 35, T 3 N, R 5 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 36

All lands in Frac. Sec. 36, T 3 N, R 5 E, 1st P. M.

MIAMI TOWNSHIP

Such lands in R 5, T 2, M.R's, Miami Township, are located in Fractional Sections 28, 29, 34, 35, and 36 as follows:

Fractional Section 28

All lands in Frac. Sec. 28, R 5, T 2, M.R's, lying W of E bank of M. & E. Canal.

Fractional Section 29

All lands in Frac. Sec. 29, R 5, T 2, M.R's, lying W of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 34

All lands in Frac. Sec. 34, R 5, T 2, M.R's.

Fractional Section 35

All lands in Frac. Sec. 35, R 5, T 2, M.R's, lying W of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 36

All lands in Frac. Sec. 36, R 5, T 2, M.R's, lying W of E right-of-way line of C. C. C. & St. L. Ry. Co., excepting those lands included within the corporate limits of the Municipal Corporation of Miamisburg.

MIAMI TOWNSHIP

(See also "Franklin Township, Warren County," for Fractional Sections 26 and 27, which lie partly in each township.)

Such lands in T 2 N, R 5 E, 1st P. M., Miami Township, are located in Fractional Sections 2, 10, 15, 22, 23, 26, and 27 as follows:

Fractional Section 2

All lands in Frac. Sec. 2, T 2 N, R 5 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of Miamisburg.

Fractional Section 10

All lands in Frac. Sec. 10, T 2 N, R 5 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of Miamisburg.

Fractional Section 15

All lands in Frac. Sec. 15, T 2 N, R 5 E, 1st P. M., lying E of W right of way line of C. H. & D. Ry. Co.

Fractional Section 22

All lands in Frac. Sec. 22, T 2 N, R 5 E, 1st P. M., lying E of W right-of way line of C. H. & D. Ry. Co.

Fractional Section 23

All lands in Frac. Sec. 23, T 2 N, R 5 E, 1st P. M.

Fractional Section 26

All lands in Frac. Sec. 26, T 2 N, R 5 E, 1st P. M., lying N of S line of Montgomery County.

Fractional Section 27

The following lands in Frac. Sec. 27, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W right-of-way line of C. H. & D. Ry. Co. with N line of Frac. Sec. 27; thence E 2400 feet more or less along said N line to point on center line of Miami River; thence southeasterly 2040 feet more or less along center line of said river to point on E line of said fractional section; thence S 1775 feet more or less along E line of said fractional section to point on S line of Montgomery County; thence W 4120 feet along said S county line; thence N 0° 50′ W 1300 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence N 2350 feet more or less along said W right-of-way line to place of beginning.

GERMAN TOWNSHIP

(See also "Franklin Township, Warren County," for Sections 29 and 30, which lie partly within each township.)

Such lands in T 2 N, R 5 E, 1st P. M., German Township, are located in Sections 18, 19, 29, and 30 as follows:

Section 18

The following lands in Sec. 18, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 18; thence N 2580 feet more or less along W line of said section to point on S corporation line of Municipal Corporation of Germantown; thence easterly 4630 feet along said S corporation line; thence S 22° 30′ E 1100 feet; thence S 23° 55′ W 1260 feet; thence S 6° 45′ W 930 feet more or less to point on S line of said section; thence W 4000 feet more or less along S line of said section to place of beginning.

Section 19

The following lands in Sec. 19, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 19, 1000 feet E of NW corner thereof; thence E 2995 feet along N line of said section; thence S 38° 35′ E 815 feet; thence S 4° 50′ W 550 feet; thence S 29° 20′ W 570 feet; thence S 10° 10′ E 780 feet more or less to point on W right-of-way line of C. N. R. R. Co.; thence SE 1450 feet along W right-of-way line of said company; thence S 11° 25′ E 1440 feet more or less to point on E line of said section; thence S 210 feet more or less along E line of said section to SE corner thereof; thence W 2010 feet along S line of said section; thence northerly 2750 feet more or less to center of said section; thence N 34° 25′ W 2045 feet; thence N 58° 00′ W 460 feet; thence northerly 700 feet more or less to place of beginning.

Section 29

The following lands in Sec. 29, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 29; thence E 30 feet more or less along N line of said section to point on E line of highway; thence SE 1100 feet along E line of said highway; thence S 29° 50′ E 3040 feet more or less to point on S line of Montgomery County; thence W 2245 feet more or less along said S line of Montgomery County to point on W line of said section; thence N 3460 feet more or less along W line of said section to place of beginning.

Section 30

The following lands in Sec. 30, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 30; thence S 3460 feet more or less along E line of said section to point on S line of Montgomery County; thence W 1230 feet along said S line of Montgomery County; thence N 11° 35′ W 1250 feet; thence N 28° 45′ W 1180 feet; thence N 0° 35′ W 1165 feet more or less to point on N line of said section; thence E 2010 feet more or less along N line of said section to place of beginning.

GERMAN TOWNSHIP

Such lands in T 3 N, R 4 E, 1st P. M., German Township, are located in Sections 11, 13, and 14 as follows:

Section 11

The following lands in Sec. 11, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 11, 1690 feet W of SE corner thereof, thence W 2180 feet along S line of said section; thence N 0° 40′ E 980 feet; thence N 23° 25′ W 300 feet more or less to point on W line of E ½ of SW ¼ of said section; thence N 1335 feet more or less along said W line to point on N line of SW ¼ of said section; thence W 600 feet along N line of said SW ¼; thence N 22° 45′ W 120 feet; thence N 80° 30′ E 420 feet; thence N 12° 45′ E 885 feet; thence due N 215 feet; thence S 34° 00′ E 1275 feet; thence S 51° 45′ E 1025 feet; thence S 26° 00′ E 880 feet; thence southerly 1395 feet more or less to place of beginning.

Section 13

The following lands in Sec. 13, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 13, 460 feet N of SW corner thereof; thence N 1150 feet more or less along W line of said section to SW corporation corner of the Municipal Corporation of Germantown; thence easterly 6060 feet more or less along S corporation line of said municipal corporation to point on E line of said section; thence S 2540 feet along E line of said section; thence N 88° 00′ W 805 feet; thence S 65° 15′ W 480 feet more or less to point on S line of said section; thence W 690 feet along S line of said section; thence N 76° 15′ W 1125 feet more or less to point on S line of highway; thence westerly 1400 feet along S line of said highway; thence westerly 835 feet more or less to place of beginning.

Section 14

The following lands in Sec. 14, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 14, 1770 feet S of NE corner thereof; thence S 2970 feet along E line of said section; thence S 79° 00′ W 240 feet; thence N 63° 35′ W 1575 feet; thence N 12° 10′ W 2065 feet; thence N 56° 30′ W 670 feet more or less to point on W line of E ½ of said section; thence N 1660 feet more or less along W line of E ½ to point on N line of said section; thence E 990 feet along N line of said section; thence S 4° 25′ E 850 feet; thence S 48° 15′ E 1315 feet; thence easterly 640 feet more or less to place of beginning.

WARREN COUNTY

Lands in Warren County now within the limits of The Miami Conservancy District that will be benefited by the works of the District are located within the corporate limits of the Municipal Corporation of Franklin, and in Franklin Township as follows: (Refer to Sheets Nos. 42, 43, 44, 45, 47, and 48 of Exhibit No. 17.)

MUNICIPAL CORPORATION OF FRANKLIN

The following lands within the corporate limits of the Municipal Corporation of Franklin included within the lines described as follows, to-wit:

Beginning at point of intersection of W bank of M. & E. Canal with E

corporation line of the Municipal Corporation of Franklin; thence southwesterly 2400 feet more or less along W bank of M. & E. Canal to point on N line of Clay Avenue extended; thence NW 85 feet more or less along N line of Clay Avenue extended to point on E line of Center Street; thence S 28° 30′ W 510 feet more or less to point on S line of Jackson Street; thence S 35° 25′ W 930 feet more or less to point on S line of Second Street; thence S 78° 30′ W 172 feet; thence southwesterly 355 feet more or less to SE corner of intersection of Third Street and Front Street; thence SW 465 feet more or less along E line of Front Street to intersection with S line of Fourth Street; thence N 59° 00′ W 60 feet more or less to point on W line of Front Street; thence SW 1128 feet along W line of Front Street; thence S 60° 30′ E 140 feet; thence S 29° 45′ W 740 feet; thence N 60° 30′ W 140 feet more or less to point on W line of Front Street; thence SW 352 feet along W line of Front Street; thence S 59° 00′ E 325 feet more or less to point on E line of Center Street; thence S 0° 50′ W 540 feet; thence N 51° 00′ E 1063 feet; thence S 46° 35′ E 825 feet more or less to point on corporation line of said corporation; thence southerly and westerly 2765 feet along said corporation line; thence N 80° 50′ W 750 feet more or less to point on W bank of M. & E. Canal; thence southwesterly 845 feet more or less along W bank of M. & E. Canal to point on W corporation line of said corporation; thence northerly and easterly 12090 feet more or less along corporation line to corporation corner near M. & E. Canal; thence S. 130 feet more or less along E corporation line to place of beginning.

FRANKLIN TOWNSHIP

(See also Miami Township, Montgomery County, for Sections 26 and 27, and German Township, Montgomery County, for Sections 29 and 30 which lie partly in each county.)

Such lands in T 2 N, R 5 E, 1st P. M., Franklin Township, are located in Fractional Sections 26, 27, and 34, and in Sections 29, 30, 31, 32, and 33 as follows:

Fractional Section 26

All lands in Frac. Sec. 26, T 2 N, R 5 E, 1st P. M., lying S of N line of Warren County.

Fractional Section 27

The following lands in Frac. Sec. 27, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 27; thence W 4140 feet along S line of said fractional section; thence N 5° 20′ E 875 feet; thence N 14° 10′ W 885 feet more or less to point on N line of Warren County; thence E 4260 feet more or less along said N county line to point on E line of said fractional section; thence S 1735 feet more or less along said E line to place of beginning.

Section 29

The following lands in Sec. 29, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 29; thence N 1925 feet more or less along W line of said section to point on N line of Warren County; thence E 2250

feet along N line of said county; thence S 25° 00′ E 1225 feet; thence S 18° 40′ W 820 feet more or less to point on S line of said section; thence W 2470 feet more or less along S line of said section to place of beginning.

Section 30

The following lands in Sec. 30, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 30; thence W 830 feet along S line of said section; thence N 31° 00′ W 900 feet; thence N 1° 55′ E 1170 feet more or less to point on N line of Warren County; thence E 1230 feet more or less along N line of Warren County to point on E line of said section; thence S 1925 feet more or less along E line of said section to place of beginning.

Section 31

All lands in Sec. 31, T 2 N, R 5 E, 1st P. M., lying E of W line of first N and S highway W of Twin Creek.

Section 32

The following lands in Sec. 32, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 32; thence E 2470 feet along N line of said section; thence S 11° 30′ E 980 feet; thence S 33° 05′ W 745 feet; thence S 1° 20′ W 515 feet; thence S 65° 40′ E 1095 feet; thence N 82° 50′ E 875 feet; thence N 8° 40′ W 1205 feet; thence N 67° 00′ E 585 feet; thence S 25° 40′ E 1490 feet more or less to point on N right-of-way line of C. C. C. & St. L. Ry. Co.; thence SW 1160 feet along said right-of-way line; thence S 80° 50′ E 620 feet; thence S 2° 15′ E 645 feet; thence S 85° 00′ E 650 feet more or less to point on E line of said section; thence S 1585 feet more or less along said E line to SE corner of said section; thence W 5370 feet more or less along S line of said section to SW corner thereof; thence N 5340 feet more or less along W line of said section to place of beginning.

Section 33

The following lands in Sec. 33, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 33; thence W 5400 feet more or less along S line of said section to SW corner thereof; thence N 1585 feet along W line of said section; thence N 87° 00′ E 1785 feet; thence N 35° 00′ E 1765 feet; thence S 56° 55′ E 350 feet; thence S 8° 55′ E 400 feet; thence S 53° 05′ E 390 feet; thence N 77° 50′ E 1545 feet; thence N 35° 00′ E 330 feet; thence N 31° 40′ W 480 feet; thence N 87° 35′ E 430 feet more or less to point on E line of said section; thence S 3255 feet more or less along said E line to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 34; thence S 140 feet more or less along E line of said fractional section to point on center line of Miami River; thence southerly 6680 feet more or less along center line of Miami River to point on S line of said fractional section; thence W 1170 feet more

or less along said S line to SW corner of said fractional section; thence N 3790 feet along W line of said fractional section; thence N 60° 50′ E 385 feet; thence N 15° 30′ E 1550 feet more or less to point on N line of said fractional section; thence E 4180 feet more or less along said N line to place of beginning.

FRANKLIN TOWNSHIP

Such lands in R 5, T 2, M.R's, Franklin Township, are located in Fractional Sections 27, 31, 32, and 33 as follows:

Fractional Section 27

All lands in Frac. Sec. 27, R 5 , T 2, M.R's, lying W of E bank of M. & E. Canal.

Fractional Section 31

All lands in Frac. Sec. 31, R 5, T 2, M.R's, lying W of W corporation line of Municipal Corporation of Franklin.

Fractional Section 32

All lands in Frac. Sec. 32, R 5, T 2, M.R's, lying W of W bank of M. & E. Canal excepting those lands included within the corporate limits of the Municipal Corporation of Franklin.

Fractional Section 33

All lands in Frac. Sec. 33, R 5, T 2, M.R's, lying W of E bank of M. & E. Canal.

FRANKLIN TOWNSHIP

Such lands in T 1 N, R 5 E, 1st P. M., Franklin Township, are located in Fractional Sections 3, 4, 5, 7, and 8 and in Section 6 as follows:

Fractional Section 3

All lands in Frac. Sec. 3, T 1 N, R 5 E, 1st P. M., excepting those lands included within the corporate limits of Municipal Corporation of Franklin.

Fractional Section 4

All lands in Frac. Sec. 4, T 1 N, R 5 E, 1st P. M., excepting those lands included within the corporate limits of Municipal Corporation of Franklin.

Fractional Section 5

All lands in Frac. Sec. 5, T 1 N, R 5 E, 1st P. M.

Section 6

The following lands in Sec. 6, T 1 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 6; thence S 5350 feet along E line of said section to SE corner thereof; thence W 5370 feet more or less along S line of said section to SW corner thereof; thence N 1880 feet along W line of said section; thence N 55° 00′ E 1950 feet; thence N 2° 30′ W 335 feet; thence N 37° 35′ E 2665 feet more or less to point on N line of said section; thence E 2095 feet more or less along said N line to place of beginning.

Fractional Section 7

All lands in Frac. Sec. 7, T 1 N, R 5 E, 1st P. M.

Fractional Section 8

All lands in Frac. Sec. 8, T 1 N, R 5 E, 1st P. M.

FRANKLIN TOWNSHIP

Such lands in R 5, T 1, M.R's, Franklin Township, are located in Fractional Section 1 as follows:

Fractional Section 1

All lands in Frac. Sec. 1, R 5, T 1, M.R's, lying N of S right-of-way line of C. C. C. & St. L. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of Franklin and excepting the tract lying E of E right-of-way line of C. N. R. R. Co. and S of N bank M. & E. Canal.

BUTLER COUNTY

Lands in Butler County now within the limits of The Miami Conservancy District, that will be benefited by the works of the District, are located within the corporate limits of the Municipal Corporations of Middletown and Hamilton, and in Madison, Lemon, St. Clair, Liberty, Fairfield, and Ross Townships as follows: (Refer to Sheets Nos. 48 to 68 of Exhibit No. 17.)

MUNICIPAL CORPORATION OF MIDDLETOWN

The following lands within the corporate limits of the Municipal Corporation of Middletown, included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Tytus Avenue with E corporation line of the Municipal Corporation of Middletown; thence S 15° 10′ W 880 feet; thence S 30° 05′ W 960 feet more or less to point on W line of Malvern Avenue; thence S 48° 40′ W 345 feet more or less to point on W line of Auburn Avenue; thence S 71° 00′ W 1250 feet more or less to point on E line of Charles Street; thence S 37° 55′ W 310 feet; thence S 78° 00′ W 680 feet more or less to point on N line of Lefferson Street; thence S 7° 20′ W 85 feet; thence N 84° 20′ W 688 feet; thence S 39° 20′ W 380 feet more or less to point on N line of Crane Street; thence S 23° 50′ W 560 feet more or less to point on N line of Second Street; thence E 325 feet along N line of Second Street; thence S 20° 30′ W 50 feet more or less to point on S line of Second Street; thence W 330 feet along S line of Second Street; thence S 23° 55′ W 372 feet; thence S 60° 45′ E 195 feet more or less to point on N line of Third Street; thence S 18° 40′ W 60 feet more or less to point on S line of Third Street; thence W 230 feet along S line of Third Street; thence S 33° 05′ W 465 feet more or less to point on N line of Fourth Street; thence E 80 feet along N line of Fourth Street; thence S 19° 15′ W 65 feet more or less to point on S line of Fourth Street; thence W 140 feet along S line of Fourth Street; thence S 30° 30′ W 485 feet; thence S 19° 50′ W 1330 feet more or less to point on N line of Fairmount Avenue; thence E 480 feet along said N line of Fairmount Avenue; thence S 4° 00′ W 65 feet more or less to point on

S line of Fairmount Avenue; thence W 490 feet along S line of Fairmount Avenue; thence S 27° 45′ W 1960 feet; thence S 37° 30′ E 260 feet; thence S 58° 05′ W 170 feet more or less to point on W line of Curtis Avenue; thence N 21° 20′ W 335 feet more or less to point on W line of Yankee Road; thence S 48° 40′ W 112 feet; thence S 3° 00′ W 815 feet more or less to point on N line of Michigan Avenue; thence S 30° 50′ W 650 feet more or less to point on S corporation line of the Municipal Corporation of Middletown; thence westerly and northerly 4970 feet more or less along corporation line to SW corporation corner on center line of Miami River; thence northerly 8660 feet more or less along W corporation line to NW corporation corner; thence easterly 7670 feet more or less along N corporation line to NE corporation corner near M. & E. Canal; thence southerly 380 feet more or less along E corporation line to place of beginning.

MUNICIPAL CORPORATION OF HAMILTON

The following lands within the corporate limits of the Municipal Corporation of Hamilton, included within the lines described as follows, to-wit:

Beginning at point on N corporation line of the Municipal Corporation of Hamilton, 165 feet W of NE corporation corner, said corner being approximately 950 feet N of Greenwood Avenue; thence S 37° 55′ W 920 feet; thence S 75° 30′ W 1018 feet; thence S 31° 40′ W 300 feet more or less to point on N line of Greenwood Avenue; thence S 30° 00′ E 490 feet; thence S 31° 20′ W 900 feet; thence S 85° 45′ E 425 feet; thence S 28° 45′ E 90 feet more or less to point on S line of Heaton Road; thence W 362 feet along S line of Heaton Road; thence S 8° 45′ W 450 feet more or less to point on W bank of M. & E. Canal; thence southerly 4865 feet more or less along W bank of M. & E. Canal to point on extended N line of John Street; thence W 40 feet more or less along extended N line of John Street to point on W line of Fourteenth Street; thence S 40° 10′ W 590 feet more or less to point on N line of Edison Avenue; thence S 18° 45′ W 1262 feet; thence S 55° 10′ W 890 feet; thence S 15° 55′ E 1750 feet more or less to point on N line of first alley N of Shenck Avenue; thence W 1095 feet more or less along N line of said alley to point on E line of Pleasant Avenue; thence northerly 1495 feet along E line of Pleasant Avenue; thence S 38° 10′ W 1155 feet; thence S 26° 45′ W 590 feet; thence S 50° 40′ W 815 feet; thence S 44° 35′ E 243 feet more or less to point on W line of Paoli Avenue; thence S 64° 15′ W 650 feet more or less to point on N line of Woodlawn Avenue; thence S 28° 30′ W 580 feet; thence S 21° 25′ E 480 feet; thence S 34° 30′ W 255 feet more or less to point on W line of River Road; thence southerly 1200 feet more or less along W line of River Road to point on S corporation line of Municipal Corporation of Hamilton; thence W 270 feet more or less along S corporation line to corporation corner; thence northerly 10125 feet more or less along W corporation line to point where corporation line turns westerly along S line of New London Pike; thence W 215 feet more or less along corporation line to point on extended W line of "B" Street; thence northerly 915 feet more or less along extended W line of "B" Street to point on S line of Elizabeth Street; thence N 11° 05′ E 1038 feet; thence N 34° 30′ E 1130 feet more or less to point on S line of Ross Avenue; thence S 80° 00′ E 140 feet more or less to point on N line of Ross Avenue; thence N 23° 55′ E 420 feet more or less to point on N line of Main Street; thence N 69° 30′ E 920 feet more or less to point on N line of Wayne Avenue; thence N 32° 45′

E 952 feet; thence N 2° 40′ W 1480 feet more or less to point on S line of Rhea Avenue; thence N 54° 40′ E 118 feet more or less to point on N line of Rhea Avenue; thence N 12° 55′ E 995 feet; thence N 85° 45′ E 555 feet; thence northwesterly 525 feet more or less to point of intersection of E line of Hunter Avenue with N line of Cereal Avenue; thence N 1° 40′ E 420 feet; thence N 80° 05′ W 630 feet; thence N 52° 15′ W 445 feet more or less to point on N corporation line of the Municipal Corporation of Hamilton; thence easterly 1428 feet along said corporation line; thence S 38° 20′ E 550 feet more or less to point on S line of Lagonda Avenue; thence SE 355 feet more or less along S line of Lagonda Avenue to point on W line of Summer Avenue; thence N 61° 50′ E 1075 feet more or less to point on N corporation line; thence E 1460 feet more or less along corporation line to corporation corner; thence southerly 2870 feet more or less along corporation line in Miami River to point where corporation line turns easterly; thence easterly 1940 feet more or less along corporation line in old river channel to point where corporation line turns S along section line; thence S 1880 feet more or less along corporation line to point where corporation line turns easterly along levee on N bank of Hydraulic Canal; thence easterly 4260 feet more or less along N corporation line to place of beginning.

MADISON TOWNSHIP

Such lands in T 2 N, R 4 E, 1st P. M., Madison Township, are located in Section 1 and in Fractional Sections 11, 12, 14, 15, 22, 27, 28, 32, and 33 as follows:

Section 1

The following lands in Sec. 1, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 1; thence W 550 feet along S line of said section; thence N 6° 30′ E 1130 feet; thence N 89° 15′ E 405 feet more or less to point on E line of said section; thence S 1115 feet more or less along said E line to place of beginning.

Fractional Section 11

The following lands in Frac. Sec. 11, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 11; thence N 245 feet along W line of said fractional section; thence S 83° 10′ E 1070 feet; thence N 28° 20′ E 370 feet; thence S 71° 30′ E 735 feet; thence N 65° 45′ E 550 feet; thence N 56° 30′ W 860 feet; thence N 3° 00′ W 590 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence NE 4360 feet more or less along said W right-of-way line to point on E line of said fractional section; thence S 3750 feet more or less along said E line to point on center line of Miami River; thence westerly 420 feet more or less along center line of said river to point on S line of said fractional section; thence W 5000 feet more or less along said S line to place of beginning.

Fractional Section 12

All lands in Frac. Sec. 12, T 2 N, R 4 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 14

All lands in Frac. Sec. 14, T 2 N, R 4 E, 1st P. M.

Fractional Section 15

All lands in Frac. Sec. 15, T 2 N, R 4 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 22

All lands in Frac. Sec. 22, T 2 N, R 4 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 27

All lands in Frac. Sec. 27, T 2 N, R 4 E, 1st P. M.

Fractional Section 28

All lands in Frac. Sec. 28, T 2 N, R 4 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 32

The following lands in Frac. Sec. 32, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 32, 4360 feet E of SW corner thereof; thence N 25° 30′ W 1960 feet more or less to point on W right-of-way line of C. H. & D. Ry Co.; thence northeasterly 2490 feet more or less along said W right-of-way line to point on E line of said fractional section; thence S 970 feet more or less along said E line to point on center line of Miami River; thence southwesterly 2670 feet more or less along center line of said river to point on S line of said fractional section; thence W 130 feet more or less along S line of said fractional section to place of beginning.

Fractional Section 33

All lands in Frac. Sec. 33, T 2 N, R 4 E, 1st P. M., lying E of W right-of-way line of C. H. & D. Ry. Co.

MADISON TOWNSHIP

Such lands in T 1 N, R 4 E, 1st P. M., Madison Township, are located in Fractional Sections 4, 5, 9, 16, 17, and 19, and in Sections 8 and 18 as follows:

Fractional Section 4

All lands in Frac. Sec. 4, T 1 N, R 4 E, 1st P. M.

Fractional Section 5

The following lands in Frac. Sec. 5, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 5; thence W 3610 feet more or less along S line of said fractional section to point on W line of highway; thence N 1420 feet along said W line of highway; thence N 56° 30′ E 1470 feet; thence N 67° 00′ E 950 feet; thence N 6° 00′ W 855 feet; thence N 16° 15′ E 480 feet; thence N 42° 55′ E 1420 feet; thence N 18° 30′ W 725 feet more or less to point on N line of said fractional section; thence E 130 feet along said N line to point on center line of Miami River; thence S 1690 feet more or less along center line of said river to point on E line of said fractional section; thence S 4150 feet more or less along said E line to place of beginning.

Section 8

All lands in Sec. 8, T 1 N, R 4 E, 1st P. M., lying E of W line of N and S highway.

Fractional Section 9

All lands in Frac. Sec. 9, T 1 N, R 4 E, 1st P. M.

Fractional Section 16

All lands in Frac. Sec. 16, T 1 N, R 4 E, 1st P. M.

Fractional Section 17

All lands in Frac. Sec. 17, T 1 N, R 4 E, 1st P. M., lying S and E of W line of the first highway to the W of and following the general course of Miami River, and sometimes known as the Woodsdale and Trenton Road.

Section 18

All lands in Sec. 18, T 1 N, R 4 E, 1st P. M., lying S and E of W line of highway sometimes known as Woodsdale and Trenton Road.

Fractional Section 19

All lands in Frac. Sec. 19, T 1 N, R 4 E, 1st P. M., excepting those lands lying N and W of N and W line of highway sometimes known as Woodsdale and Trenton Road.

LEMON TOWNSHIP

Such lands in R 5, T 1, M.R's, Lemon Township, are located in Fractional Section 7 as follows:

Fractional Section 7

All lands in Frac. Sec. 7, R 5, T 1, M.R's, lying N of S right-of-way line of C. C. C. & St. L. Ry. Co.

LEMON TOWNSHIP

Such lands in R 4, T 2, M.R's, Lemon Township, are located in Sections 17, 23, 26, and 27, and in Fractional Sections 12, 18, 24, 28, 29, 30, 31, 32, and 33 as follows:

Fractional Section 12

All lands in Frac. Sec. 12, R 4, T 2, M.R's, lying N of S right-of-way line of C. C. C. & St. L. Ry. Co.

Section 17

All lands in Sec. 17, R 4, T 2, M.R's, lying N of S right-of-way line of C. E. Ry. Co.

Fractional Section 18

The following lands in Frac. Sec. 18, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 18; thence N 5960 feet more or less along W line of said fractional section to point on center line of old channel

of Miami River; thence easterly 7090 feet more or less along said center line of river to point on E line of said fractional section; thence S 1150 feet more or less along said E line to point on W right-of-way line of C. C. C. & St. L. Ry. Co.; thence S 48° 50′ W 625 feet; thence N 89° 30′ W 825 feet; thence S 44° 00′ W 730 feet; thence S 64° 40′ W 815 feet; thence S 46° 40′ W 1425 feet; thence N 80° 30′ W 675 feet; thence S 50° 50′ W 1235 feet more or less to point on S line of said fractional section; thence W 570 feet more or less along said S line to place of beginning.

Section 23

All lands in Sec. 23, R 4, T 2, M.R's, lying N of S right-of-way line of O. E. Ry. Co., excepting those lands included within the corporate limits of the Municipal Corporation of Middletown.

Fractional Section 24

All lands in Frac. Sec. 24, R 4, T 2, M.R's.

Section 26

The following lands in Sec. 26, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 26; thence E 1710 feet along N line of said section; thence S 44° 05′ E 1185 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 830 feet along said W right-of-way line; thence N 77° 20′ W 675 feet; thence N 23° 10′ W 495 feet; thence S 71° 50′ W 555 feet; thence S 10° 50′ W 650 feet; thence S 44° 05′ W 720 feet; thence S 9° 40′ E 1210 feet more or less to point on S line of Lot 3 of Village of Amanda, sometimes known as Excello Post Office; thence easterly 215 feet more or less to SE corner of Lot 10 of said village; thence northeasterly 485 feet more or less to SW corner of Lot 108 of said village; thence northeasterly 150 feet more or less to NE corner of said Lot 108; thence S 54° 30′ E 80 feet more or less to point on E right-of-way line of C. H. & D. Ry. Co.; thence southwesterly 1970 feet more or less along said E right-of-way line to point on W line of said section; thence N 4650 feet more or less along said W line to place of beginning.

Section 27

The following lands in Sec. 27, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 27; thence N 4790 feet more or less along W line of said section to point on corporation line of Municipal Corporation of Middletown; thence E and S 3920 feet more or less along said corporation line to point 900 feet W of NE corner of tract containing 102.92 acres, said tract being owned by The Woodside Cemetery Association; thence S 41° 15′ W 1645 feet; thence S 11° 15′ W 710 feet; thence S 31° 10′ E 1440 feet more or less to point on S line of said section; thence W 1710 feet more or less along said S line to place of beginning.

Fractional Section 28

All lands in Frac. Sec. 28, R 4, T 2, M.R's, excepting those lands included within the corporate limits of Municipal Corporation of Middletown.

Fractional Section 29

All lands in Frac. Sec. 29, R 4, T 2, M.R's, excepting those lands included within the corporate limits of Municipal Corporation of Middletown.

Fractional Section 30

All lands in Frac. Sec. 30, R 4, T 2, M.R's.

Fractional Section 31

All lands in Frac. Sec. 31, R 4, T 2, M.R's, lying W of E right-of-way line of C. H. & D. Ry. Co.

Fractional Section 32

All lands in Frac. Sec. 32, R 4, T 2, M.R's, excepting those lands lying S and E of E right-of-way line of C. H. & D. Ry. Co.

Fractional Section 33

All lands in Frac. Sec. 33, R 4, T 2, M.R's, excepting those lands included within the corporate limits of Municipal Corporation of Middletown.

LEMON TOWNSHIP

Such lands in R 4, T 1, M.R's, Lemon Township, are located in Fractional Sections 2 and 3 as follows:

Fractional Section 2

All lands in Frac. Sec. 2, R 4, T 1, M.R's.

Fractional Section 3

All lands in Frac. Sec. 3, R 4, T 1, M.R's.

LEMON TOWNSHIP

Such lands in R 3, T 3, M.R's, Lemon Township, are located in Fractional Sections 35 and 36 as follows:

Fractional Section 35

All lands in Frac. Sec. 35, R 3, T 3, M.R's, lying W of E right-of-way line of C. H. & D. Ry. Co.

Fractional Section 36

All lands in Frac. Sec. 36, R 3, T 3, M.R's, lying W of E right-of-way line of C. H. & D. Ry. Co.

LEMON TOWNSHIP

Such lands in R 3, T 2, M.R's, Lemon Township, are located in Fractional Sections 5 and 11 as follows:

Fractional Section 5

All lands in Frac. Sec. 5, R 3, T 2, M.R's, lying N of S right-of-way line of C. H. & D. Ry. Co.

Fractional Section 11

All lands in Frac. Section 11, R 3, T 2, M.R's, lying N of S right-of-way line of C. H. & D. Ry. Co.

ST. CLAIR TOWNSHIP

(Refer also to "St. Clair and Fairfield Townships" for Fractional Sections 21, 28, and 29 which lie partly in each township.)

Such lands in T 2 N, R 3 E, 1st P. M., St. Clair Township, are located in Sections 9 and 16 and in Fractional Sections 14, 15, 22, 23, 24, and 31 as follows:

Section 9

All lands in S ½ of Sec. 9, T 2 N, R 3 E, 1st P. M., lying E and N of the foot of the hills along the W bank of Fourmile Creek.

Fractional Section 14

All lands in Frac. Sec. 14, T 2 N, R 3 E, 1st P. M., lying S of S line of highway sometimes known as Augspurger Road.

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 15; thence N 2585 feet more or less along W line of said fractional section to point on N right-of-way line of C. D. & T. Tr. Co.; thence NE 1415 feet along said N right-of-way line; thence S 38° 20′ E 2355 feet more or less to point on E right-of-way line of C. H. & D. Ry. Co.; thence NE 1025 feet along said E right-of-way line; thence S 26° 00′ E 1800 feet; thence N 19° 45′ E 600 feet; thence S 8° 35′ E 570 feet more or less to point on S line of highway; thence E 955 feet more or less along said S line of highway to point on E line of said fractional section; thence S 300 feet more or less along said E line to point on center line of Miami River; thence westerly 2350 feet more or less along center line of said river to point on S line of said fractional section; thence W 3050 feet more or less along S line of said fractional section to place of beginning.

Section 16

The following lands in Sec. 16, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 16; thence S 5400 feet more or less along E line of said section to SE corner thereof; thence W 3650 feet along S line of said section; thence N 45° 25′ E 635 feet; thence N 17° 20′ E 760 feet; thence N 39° 15′ E 2290 feet; thence N 0° 20′ E 1200 feet; thence N 25° 00′ W 1320 feet more or less to point on N line of said section; thence E 1990 feet more or less along N line of said section to place of beginning.

Fractional Section 22

All lands in Frac. Sec. 22, T 2 N, R 3 E, 1st P. M.

Fractional Section 23

All lands in Frac. Sec. 23, T 2 N, R 3 E, 1st P. M., lying S of N line of highway sometimes known as Augspurger Road.

Fractional Section 24

All lands in Frac. Sec. 24, T 2 N, R 3 E, 1st P. M., lying S of N line of highway sometimes known as Augspurger Road.

Fractional Section 31

All lands in SE ¼ of Frac. Sec. 31, T 2 N, R 3 E, 1st P. M., lying E of W line of first highway W of Miami River, excepting those lands included within the corporate limits of Municipal Corporation of Hamilton.

ST. CLAIR TOWNSHIP

Such lands in T 1 N, R 3 E, 1st P. M., St. Clair Township, are located in Fractional Sections 5, 6, 7, 8, and 18 as follows:

Fractional Section 5

All lands in Frac. Sec. 5, T 1 N, R 3 E, 1st P. M.

Fractional Section 6

All lands in Frac. Sec. 6, T 1 N, R 3 E, 1st P. M., lying E of W line of first highway W of Miami River.

Fractional Section 7

All lands in Frac. Sec. 7, T 1 N, R 3 E, 1st P. M., lying E of W line of first highway W of Miami River.

Fractional Section 8

All lands in Frac. Sec. 8, T 1 N, R 3 E, 1st P. M.

Fractional Section 18

All lands in Frac. Sec. 18, T 1 N, R 3 E, 1st P. M., lying E of E line of first highway W of Miami River.

ST. CLAIR AND FAIRFIELD TOWNSHIPS

(Refer also to St. Clair Township and Fairfield Township.)

Such lands in T 2 N, R 3 E, 1st P. M., St. Clair and Fairfield Townships, are located in Fractional Sections 21, 28, and 29 as follows:

Fractional Section 21

The following lands in Frac. Sec. 21, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point where W right-of-way line of C. D. & T. Tr. Co. intersects S line of Frac. Sec. 21; thence northerly 3100 feet along said W right-of-way line; thence N 8° 00′ W 2480 feet more or less to point on N line of said fractional section; thence E 3600 feet more or less along N line of said fractional section to NE corner thereof; thence southerly 4660 feet more or less along E fractional section line to point on center line of old channel of Miami River; thence westerly and southerly 1080 feet more or less along said center line of river to point on S line of said fractional section; thence W 4190 feet more or less along S line of said fractional section to place of beginning.

Fractional Section 28

All lands in Frac. Sec. 28, T 2 N, R 3 E, 1st P. M., lying E of W right-of-way line of C. D. &T. Tr. Co., excepting those lands included within the corporate limits of Municipal Corporation of Hamilton.

Fractional Section 29

All lands in Frac. Sec. 29, T 2 N, R 3 E, 1st P. M., lying E of W right-of-way line of C. D. & T. Tr. Co., excepting those lands included within the corporate limits of the Municipal Corporation of Hamilton.

LIBERTY TOWNSHIP

Such lands in R 3, T 2, M.R's, Liberty Township, are located in Fractional Section 10 as follows:

Fractional Section 10

All lands in Frac. Sec. 10, R 3, T 2, M.R's, lying N of S right-of-way line of C. H. & D. Ry. Co.

FAIRFIELD TOWNSHIP

Such lands in R 3, T 2, M.R's, Fairfield Township, are located in Sections 26 and 32 and in Fractional Sections 16, 22, 27, 28, 33, and 34 as follows:

Fractional Section 16

All lands in Frac. Sec. 16, R 3, T 2, M.R's, lying N and W of S right-of-way line of C. H. & D. Ry. Co.

Fractional Section 22

All lands in Frac. Sec. 22, R 3, T 2, M.R's, lying N of N bank of M. & E. Canal.

Section 26

All lands in Sec. 26, R 3, T 2, M.R's, lying W of W bank of M. & E. Canal.

Fractional Section 27

All lands in Frac. Sec. 27, R 3, T 2, M.R's, lying W of W bank of M. & E. Canal.

Fractional Section 28

All lands in Frac. Sec. 28, R 3, T 2, M.R's, lying N of N bank of M. & E. Canal.

Section 32

All lands in NW ¼ of Sec. 32, R 3, T 2, M.R's, excepting those lands included within the corporate limits of Municipal Corporation of Hamilton.

Fractional Section 33

All lands in Frac. Sec. 33, R 3, T 2, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 33, 640 feet W of SE corner thereof; thence W 740 feet along S line of said fractional section; thence N 25° 20′ E 1130 feet; thence S 58° 45′ E 500 feet; thence S 3° 00′ E 480 feet; thence southwesterly 365 feet more or less to place of beginning.

Fractional Section 34

All lands in Frac. Sec. 34, R 3, T 2, M.R's.

FAIRFIELD TOWNSHIP

(Refer also to "St. Clair and Fairfield Townships" for Fractional Sections 21, 28 and 29, which lie partly in each township.)

Such lands in T 2 N, R 3 E, 1st P. M., Fairfield Township, are located in Fractional Section 27 as follows:

Fractional Section 27

All lands in Frac. Sec. 27, T 2 N, R 3 E, 1st P. M.

FAIRFIELD TOWNSHIP

Such lands in R 2, T 1, M.R's, Fairfield Township, are located in Sections 4, 8, and 9 and in Fractional Sections 5, 6, 10, 11, 14, 15, 16, 17, and 20 as follows:

Section 4

The following lands in Sec. 4, R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 4; thence E 3540 feet along N line of said section; thence S 18° 30′ W 1035 feet; thence S 45° 30′ E 395 feet; thence S 34° 30′ W 540 feet; thence N 80° 00′ W 390 feet; thence N 14° 05′ W 365 feet; thence S 39° 35′ W 780 feet; thence S 68° 00′ W 1480 feet; thence N 88° 00′ W 580 feet; thence S 4° 50′ W 850 feet; thence S 42° 50′ W 480 feet more or less to point on W line of said section; thence N 3620 feet more or less along said W line to place of beginning.

Fractional Section 5

The following lands in Frac. Sec. 5, R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 5 with W line of first highway E of Miami River; thence S 2535 feet along said W line of highway; thence S 25° 50′ W 920 feet; thence S 17° 00′ E 1210 feet; thence S 18° 30′ W 1000 feet more or less to point on S line of said fractional section; thence W 3540 feet more or less along said S line to SW corner of said fractional section; thence N 5180 feet more or less along W line of said fractional section to point on center line of Miami River; thence E 2400 feet more or less along center line of said river to point on N line of said fractional section; thence E 880 feet more or less along said N line to place of beginning.

Fractional Section 6

All lands in Frac. Sec. 6, R 2, T 1, M.R's, lying W of W line of first highway E of Miami River, excepting those lands included within the corporate limits of Municipal Corporation of Hamilton.

Section 8

The following lands in Sec. 8, R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 8; thence E 285 feet along N line of said section; thence S 3° 25′ W 950 feet; thence S 75° 00′ W 260 feet more or less to point on W line of said section; thence N 1000 feet more or less along said W line to place of beginning.

Section 9

The following lands in Sec. 9, R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 9; thence S 11° 20′ E 1640 feet; thence N 30° 40′ E 720 feet; thence S 35° 55′ E 1615 feet; thence S 16° 20′ W 1055 feet; thence N 82° 20′ E 1000 feet; thence S 1° 00′ W 885 feet; thence N 63° 25′ W 1480 feet; thence S 6° 45′ W 965 feet; thence S 38° 20′ W 1090 feet more or less to point on S line of said section; thence W 290 feet more or less along said S line to SW corner of said section; thence N 5230 feet more or less along W line of said section to place of beginning.

Fractional Section 10

All lands in Frac. Sec. 10, R 2, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 10; thence N 240 feet along W line of said fractional section; thence S 88° 10′ E 530 feet; thence N 61° 40′ E 1065 feet; thence N 89° 00′ E 1925 feet; thence N 4° 30′ E 515 feet; thence S 87° 15′ E 1260 feet; thence N 17° 35′ W 485 feet; thence S 86° 15′ E 425 feet; thence N 42° 50′ E 880 feet more or less to point on E line of said fractional section; thence S 1820 feet more or less along said E line to SE corner of said fractional section; thence W 5500 feet more or less along S line of said fractional section to place of beginning.

Fractional Section 11

All lands in Frac. Sec. 11, R 2, T 1, M.R's.

Fractional Section 14

All lands in Frac. Sec. 14, R 2, T 1, M.R's, lying N of the foot of the hills.

Fractional Section 15

All lands in Frac. Sec. 15, R 2, T 1, M.R's.

Fractional Section 16

All lands in Frac. Sec. 16, R 2, T 1, M.R's.

Fractional Section 17

All lands in Frac. Sec. 17, R 2, T 1, M.R's.

Fractional Section 20

All lands in Frac. Sec. 20, R 2, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 20; thence W 3825 feet along S line of said fractional section; thence N 54° 40′ E 1105 feet; thence N 79° 05′ E 1705 feet; thence S 86° 20′ E 785 feet; thence S 50° 40′ E 145 feet; thence N 88° 35′ E 400 feet more or less to point on E line of said fractional section; thence S 1085 feet more or less along said E line to place of beginning.

ROSS TOWNSHIP

Such lands in T 3 N, R 2 E, 1st P. M., Ross Township, are located in Sections 22, 27, and 33 and in Fractional Sections 13, 14, 23, 24, 25, 26, 34, 35, and 36 as follows:

Fractional Section 13

All lands in S ½ of Frac. Sec. 13, T 3 N, R 2 E, 1st P. M., and also all lands in N ½ of said fractional section lying S and E of N line of first highway W of Miami River.

Fractional Section 14

The following lands in Frac. Sec. 14, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 14, 2920 feet S of NE corner thereof; thence S 48° 35′ W 1190 feet; thence S 19° 05′ W 1050 feet; thence S 6° 30′ W 725 feet more or less to point on S line of said fractional section; thence E 215 feet more or less to point on center line of old channel of Miami River; thence northerly and easterly 2550 feet more or less along center line of said river to point on E line of said fractional section; thence N 670 feet more or less along said E line to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 23; thence N 1830 feet more or less to point on W line of highway sometimes known as Oxford Pike; thence northeasterly 1265 feet along said W line of highway; thence S 56° 45′ E 1640 feet; thence S 2° 00′ W 630 feet; thence N 85° 55′ E 970 feet; thence N 29° 05′ E 520 feet; thence N 7° 10′ E 2855 feet; thence N 9° 30′ W 965 feet more or less to point on N line of said fractional section; thence E 175 feet more or less along said N line to point on center line of old channel of Miami River; thence southerly 5400 feet more or less along said center line of river to point on S line of said fractional section; thence W 4700 feet more or less along said S line to place of beginning.

Section 22

The following lands in Sec. 22, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point where E line of highway, sometimes known as Oxford Pike, intersects E line of Sec. 22; thence S 1690 feet along E line of said section; thence N 33° 00′ W 960 feet more or less to point on E line of said highway; thence northerly 1045 feet more or less along said E line of highway to place of beginning.

Fractional Section 24

All lands in Frac. Sec. 24, T 3 N, R 2 E, 1st P. M.

Fractional Section 25

All lands in Frac. Sec. 25, T 3 N, R 2 E, 1st P. M.

Fractional Section 26

All lands in Frac. Sec. 26, T 3 N, R 2 E, 1st P. M.

Section 27

The following lands in Sec. 27, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 27; thence W 3430 feet along S line of

said section; thence N 37° 50′ E 980 feet; thence N 80° 55′ E 1905 feet; thence N 46° 45′ W 580 feet; thence N 9° 45′ E 2395 feet; thence N 53° 25′ E 1150 feet more or less to point on E line of said section; thence S 4420 feet more or less along said E line to place of beginning.

Section 33

The following lands in Sec. 33, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 33; thence W 5370 feet more or less along S line of said section to SW corner thereof; thence N 665 feet along W line of said section; thence N 45° 00′ E 1550 feet; thence N 27° 35′ E 1110 feet more or less to point on N line of highway sometimes known as Brookville Road; thence E 3670 feet more or less along N line of highway to point on E line of said section; thence S 2825 feet more or less along said E line to place of beginning.

Fractional Section 34

All lands in Frac. Sec. 34, T 3 N, R 2 E, 1st P. M., lying S and E of N lines of highways sometimes known as Oxford Pike and Brookville Road.

Fractional Section 35

All lands in Frac. Sec. 35, T 3 N, R 2 E, 1st P. M.

Fractional Section 36

All lands in Frac. Sec. 36, T 3 N, R 2 E, 1st P. M.

HAMILTON COUNTY

Lands in Hamilton County, now within the limits of The Miami Conservancy District, that will be benefited by the works of the District, are located within the corporate limits of the Municipal Corporation of Cleves, and in Crosby, Colerain, Whitewater, and Miami Townships, as follows: (Refer to Sheets Nos. 67 to 76 of Exhibit No. 17.)

MUNICIPAL CORPORATION OF CLEVES

The following lands within the corporate limits of the Municipal Corporation of Cleves, included within the lines described as follows, to-wit:

Beginning at point of intersection of N corporation line of Municipal Corporation of Cleves with W line of first highway E of Miami River, sometimes known as Miami Avenue or Cleves and Dugan Gap Road; thence S 1905 feet more or less along said W line of highway to point on S line of Morgan Street; thence E 70 feet more or less along said S line of Morgan Street to point on E line of Miami Avenue; thence S 500 feet along said E line of Miami Avenue; thence S 43° 00′ W 115 feet; thence S 9° 30′ W 740 feet; thence S 42° 35′ W 470 feet; thence S 24° 20′ E 630 feet; thence S 39° 00′ W 1325 feet more or less to point on S line of Frac. Sec. 21, F R 2, T 1, M.R's; thence W 850 feet more or less along S line of said fractional section to point on S line of highway; thence W 670 feet more or less along said S line of highway to point on corporation line of said corporation; thence N and E along said corporation line to place of beginning.

CROSBY TOWNSHIP

Such lands in T 2 N, R 1 E, 1st P. M., Crosby Township, are located in Fractional Section 24 as follows:

Fractional Section 24

All lands in Frac. Sec. 24, T 2 N, R 1 E, 1st P. M., lying S and E of W line of first highway W of Miami River.

CROSBY TOWNSHIP

Such lands in T 2 N, R 2 E, 1st P. M., Crosby Township, are located in Fractional Sections 3, 4, 9, 16, 17, 18, and 19, and in Sections 5 and 8, as follows:

Fractional Section 3

All lands in Frac. Sec. 3, T 2 N, R 2 E, 1st P. M.

Fractional Section 4

All lands in Frac. Sec. 4, T 2 N, R 2 E, 1st P. M.

Section 5

The following lands in Sec. 5, T 2 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 5; thence S 5385 feet more or less along E line of said section to SE corner thereof; thence W 2000 feet along S line of said section; thence N 5° 20′ W 955 feet; thence N 15° 50′ E 835 feet; thence N 9° 25′ W 2360 feet; thence N 21° 30′ E 1440 feet more or less to point on N line of said section; thence E 1560 feet more or less along said N line to place of beginning.

Section 8

All lands in Sec. 8, T 2 N, R 2 E, 1st P. M., lying N and E of E line of highway extending N from New Baltimore and following the general course of the Miami River.

Fractional Section 9

All lands in Frac. Sec. 9, T 2 N, R 2 E, 1st P. M., lying N and E of W line of highway extending N from New Baltimore and following the general course of the Miami River.

Fractional Section 16

All lands in Frac. Sec. 16, T 2 N, R 2 E, 1st P. M., lying E and S of the W line of highway extending N from New Baltimore and following the general course of the Miami River, excepting those lands included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Frac. Sec. 16 with N line of Main Street of Village of New Baltimore; thence E 1110 feet more or less along said N line of Main Street to point on W line of Columbia Street; thence easterly 65 feet more or less to point of intersection of E line of Columbia Street with N line of highway; thence E 115 feet along said N line of highway; thence S 45° 20′ W 635 feet; thence N 79° 20′ W 845 feet more or less to point on W line of said fractional section; thence N 345 feet more or less along said W line to place of beginning.

Fractional Section 17

All lands in Frac. Sec. 17, T 2 N, R 2 E, 1st P. M., lying S and W of E line of highway extending in a northwesterly direction from New Baltimore to Fernald Station, excepting those lands included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Main Street of Village of New Baltimore with E line of said fractional section; thence S 340 feet along said E line; thence N 70° 15′ W 1070 feet more or less to point on said N line of Main Street; thence E 990 feet more or less along said N line of Main Street to place of beginning.

Fractional Section 18

All lands in Frac. Sec. 18, T 2 N, R 2 E, 1st P. M., lying E of W line of first highway W of Miami River, sometimes known as Cleves and Hamilton Inter-county Highway.

Fractional Section 19

All lands in Frac. Sec. 19, T 2 N, R 2 E, 1st P. M., lying S of W line of first highway W of Miami River.

COLERAIN TOWNSHIP

Such lands in R 2, T 1, M.R's, Colerain Township, are located in Fractional Sections 19 and 25 as follows:

Fractional Section 19

All lands in Frac. Sec. 19, R 2, T 1, M.R's, lying W of E line of first highway E of Miami River, excepting those lands included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 19 with E line of said highway; thence southwesterly 2465 feet more or less along said E line of highway to highway corner; thence N 46° 15′ E 1700 feet more or less to point on N line of said fractional section; thence E 870 feet more or less along said N line to place of beginning.

Fractional Section 25

All lands in Frac. Sec. 25, R 2, T 1, M.R's, lying W of E line of first highway E of Miami River.

COLERAIN TOWNSHIP

Such lands in R 1, T 1, M.R's, Colerain Township, are located in Fractional Sections 1, 2, 4, 7, 8, 9, 10, and 15 as follows:

Fractional Section 1

The following lands in Frac. Sec. 1, R 1, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 1 with E right-of-way line of C. & O. Ry. Co.; thence S 3700 feet more or less along said E right-of-way line to point on E line of highway sometimes known as Miami River Road; thence S 2400 feet more or less along said E line of highway to point on S line of said fractional section; thence W 1375 feet more or

less along said S line to point on center line of Miami River; thence northwesterly 620 feet more or less along center line of said river to point on W line of said fractional section; thence N 2850 feet more or less along said W line to point on center line of said river; thence N 2400 feet more or less along center line of said river to point on N line of said fractional section; thence E 380 feet more or less along said N line to place of beginning.

Fractional Section 2

All lands in Frac. Sec. 2, R 1, T 1, M.R's, lying W and S of E line of first highway E of Miami River, sometimes known as Miami River Road.

Fractional Section 4

All lands in Frac. Sec. 4, R 1, T 1, M.R's, lying N and W. of E line of highway sometimes known as Miami River Road, excepting those lands included within the lines described as follows, to-wit:

Beginning at SW corner of said fractional section; thence N 750 feet along W line of said fractional section; thence N 60° 20′ E 760 feet more or less to point on E line of said highway; thence S 1180 feet more or less along said E line of highway to point on S line of said fractional section; thence W 340 feet more or less along said S line to place of beginning.

Fractional Section 7

All lands in Frac. Sec. 7, R 1, T 1, M.R's.

Fractional Section 8

The following lands in Frac. Sec. 8, R 1, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 8; thence E 1940 feet along N line of said fractional section; thence S 0° 15′ E 400 feet; thence S 18° 40′ E 1245 feet; thence S 51° 35′ E 1360 feet; thence N 16° 05′ E 460 feet more or less to point on W right-of-way line of C. & O. Ry. Co.; thence SE 2370 feet more or less along said W right-of-way line to point on E line of highway; thence southerly 725 feet more or less along said E line of highway to point on E line of said fractional section; thence S 515 feet more or less along said E line to point on center line of Miami River; thence northwesterly 7120 feet more or less to point on W line of said fractional section; thence N 450 feet more or less along said W line to place of beginning.

Fractional Section 9

The following lands in Frac. Sec. 9, R 1, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 9; thence N 1310 feet more or less along W line of said fractional section to point on center line of Miami River; thence northerly 5300 feet more or less along center line of said river to point on N line of said fractional section; thence E 1500 feet along said N line; thence S 48° 05′ W 715 feet; thence S 40° 05′ W 1805 feet; thence S 3° 40′ E 425 feet; thence S 42° 20′ W 1765 feet; thence N 86° 30′ W 300 feet; thence S 40° 35′ W 320 feet; thence S 3° 35′ E 585 feet more or less to point on S line of said fractional section; thence W 1940 feet more or less along said S line to place of beginning.

Fractional Section 10

All lands in Frac. Sec. 10, R 1, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 10; thence W 295 feet along S line of said fractional section; thence N 5° 55′ E 355 feet; thence N 38° 30′ E 500 feet more or less to point on E line of said fractional section; thence S 750 feet more or less along said E line to place of beginning.

Fractional Section 15

All lands in Frac. Sec. 15, R 1, T 1, M.R's.

COLERAIN TOWNSHIP

Such lands in R 1, T 2, M.R's, Colerain Township, are located in Fractional Sections 28, 29, 30, 34, and 36 as follows:

Fractional Section 28

The following lands in Frac. Sec. 28, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 28, 230 feet W of W line of highway sometimes known as Miami River Road or River Road; thence S 19° 10′ W 1060 feet; thence S 35° 10′ W 850 feet more or less to point on said W line of highway; thence SW 590 feet more or less along said W line of highway to point on W line of said fractional section; thence N 370 feet more or less along W line of said fractional section to point on center line of Miami River; thence northerly 1980 feet more or less along center line of said river to point on N line of said fractional section; thence E 665 feet more or less along said N line to place of beginning.

Fractional Section 29

All lands in Frac. Sec. 29, R 1, T 2, M.R's, lying W of E line of highway sometimes known as Miami River Road or River Road, excepting those lands included within the lines described as follows, to-wit:

Beginning at intersection of E line of highway sometimes known as Miami River Road or River Road with S line of Frac. Sec. 29; thence W 300 feet along said S line; thence N 8° 05′ W 540 feet; thence N 24° 20′ E 1210 feet; thence N 76° 00′ W 450 feet; thence N 2° 10′ W 465 feet; thence S 84° 00′ E 600 feet more or less to point on E line of said highway; thence S 2270 feet more or less along said E line of highway to place of beginning.

Fractional Section 30

All lands in Frac. Sec. 30, R 1, T 2, M.R's, lying W of E line of first highway E of Miami River.

Fractional Section 34

All lands in Frac. Sec. 34, R 1, T 2, M.R's, lying N of S line of highway sometimes known as Miami River Road or River Road.

Fractional Section 36

All lands in Frac. Sec. 36, R 1, T 2, M.R's.

WHITEWATER TOWNSHIP

Such lands in T 2 N, R 1 E, 1st P. M., Whitewater Township, are located in Fractional Section 25 and in Section 36 as follows:

Fractional Section 25

All lands in Frac. Sec. 25, T 2 N, R 1 E, 1st P. M., lying E of W line of first highway W of Miami River.

Section 36

All lands in Sec. 36, T 2 N, R 1 E, 1st P. M., lying E and N of W line of first highway W of Miami River.

WHITEWATER TOWNSHIP

Such lands in T 2 N, R 2 E, 1st P. M., Whitewater Township, are located in Fractional Sections 30 and 31 as follows:

Fractional Section 30

All lands in Frac. Sec. 30, T 2 N, R 2 E, 1st P. M.

Fractional Section 31

All lands in Frac. Sec. 31, T 2 N, R 2 E, 1st P. M., lying E of W line of first highway W of Miami River, excepting those lands included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Frac. Sec. 31 with W line of said highway; thence N 2300 feet along said W line of highway; thence N 89° 35′ E 320 feet; thence S 29° 50′ E 690 feet; thence S 43° 55′ W 285 feet; thence S 24° 35′ E 1035 feet; thence S 3° 00′ W 425 feet more or less to point on S line of said fractional section; thence W 100 feet more or less along S line of said fractional section to place of beginning.

WHITEWATER TOWNSHIP

Such lands in T 1 N, R 1 E, 1st P. M., Whitewater Township, are located in Fractional Sections 11, 12, 15, 20, 21, 22, 27, 28, 29, and 31, and in Sections 1, 2, 3, 10, and 30 as follows:

Section 1

All lands in Sec. 1, T 1 N, R 1 E, 1st P. M., lying E of E line of first highway W of Miami River.

Section 2

The following lands in Sec. 2, T 1 N, R 1 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 2; thence N 305 feet more or less along W line of said section to point on N line of highway; thence E 1900 feet along said N line of highway; thence S 58° 00′ E 1120 feet more or less to point on S line of said section; thence W 2760 feet along said S line to place of beginning.

Section 3

All lands in Sec. 3, T 1 N, R 1 E, 1st P. M., lying S and E of N line of first highway N of Miami River.

Section 10

All lands in Sec. 10, T 1 N, R 1 E, 1st P. M., lying E of W line of first highway W of Miami River.

Fractional Section 11

All lands in Frac. Sec. 11, T 1 N, R 1 E, 1st P. M., lying S and W of S line of first highway N of Miami River.

Fractional Section 12

The following lands in Frac. Sec. 12, T 1 N, R 1 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Frac. Sec. 12, 605 feet S of NW corner thereof; thence S 59° 40′ E 1980 feet; thence N 46° 15′ E 650 feet; thence S 0° 45′ W 740 feet; thence N 59° 30′ E 940 feet; thence N 64° 50′ E 1560 feet; thence N 47° 15′ E 425 feet more or less to point on E line of highway; thence NE 700 feet more or less along said E line of highway to point on N line of said fractional section; thence E 475 feet more or less along said N line to NE corner of said fractional section; thence S 1050 feet more or less along E line of said fractional section to point on center line of Miami River; thence W 6075 feet more or less along center line of said river to point on W line of said fractional section; thence N 1790 feet more or less along said W line to place of beginning.

Fractional Section 15

All lands in Frac. Sec. 15, T 1 N, R 1 E, 1st P. M., lying E of W line of first highway W of Miami River, excepting those lands included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of Frac. Sec. 15 with W line of said highway; thence N 1800 feet along said W line of highway; thence S 43° 00′ E 595 feet; thence S 17° 30′ W 495 feet; thence S 5° 15′ E 840 feet more or less to point on S line of said fractional section; thence W 720 feet more or less along said S line to place of beginning.

Fractional Section 20

All lands in E ½ of Frac. Sec. 20, T 1 N, R 1 E, 1st P. M.

Fractional Section 21

All lands in Frac. Sec. 21, T 1 N, R 1 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 21; thence S 3650 feet along E line of said fractional section; thence N 81° 25′ W 670 feet; thence N 68° 15′ W 1030 feet; thence N 39° 30′ W 860 feet; thence N 86° 10′ W 1210 feet; thence N 33° 45′ W 600 feet; thence N 15° 15′ W 445 feet; thence N 8° 05′ E 1515 feet more or less to point on N line of said fractional section; thence E 3610 feet more or less along said N line to place of beginning.

Fractional Section 22

All lands in Frac. Sec. 22, T 1 N, R 1 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at NW corner of said fractional section; thence E 1915 feet along N line of said fractional section; thence S 25° 30′ E 400 feet; thence

S 17° 05′ W 1680 feet; thence S 30° 35′ W 1240 feet; thence S 56° 45′ W 1135 feet more or less to point on W line of said fractional section; thence N 3650 feet more or less along said W line to place of beginning.

Fractional Section 27

All lands in Frac. Sec. 27, T 1 N, R 1 E, 1st P. M.

Fractional Section 28

All lands in Frac. Sec. 28, T 1 N, R 1 E, 1st P. M.

Fractional Section 29

All lands in Frac. Sec. 29, T 1 N, R 1 E, 1st P. M.

Section 30

All lands in SE ¼ of Sec. 30, T 1 N, R 1 E, 1st P. M.

Fractional Section 31

All lands in E ½ of Frac. Sec. 31, T 1 N, R 1 E, 1st P. M.

WHITEWATER TOWNSHIP

Such lands in T 1 N, R 2 E, 1st P. M., Whitewater Township, are located in Fractional Sections 6 and 7 as follows:

Fractional Section 6

All lands in Frac. Sec. 6, T 1 N, R 2 E, 1st P. M., excepting those lands included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 6; thence E 870 feet along N line of said fractional section; thence S 39° 50′ E 360 feet; thence S 57° 30′ W 230 feet more or less to point on E line of highway; thence S 280 feet along said E line of highway; thence S 22° 50′ E 485 feet; thence S 14° 00′ W 320 feet; thence southerly 830 feet more or less to highway corner; thence southerly 2530 feet more or less along E line of highway to point on W line of said fractional section; thence N 4560 feet more or less along said W line to place of beginning.

Fractional Section 7

All lands in Frac. Sec. 7, T 1 N, R 2 E, 1st P. M.

WHITEWATER TOWNSHIP

Such lands in Whitewater Township near the mouth of Miami River, including Guard's Island, not classified according to Congressional Townships, are located as follows:

Lands near the mouth of the Miami River including Guard's Island

All those lands near the mouth of the Miami River lying W of center line of said river, E of the Ohio and Indiana state line, and S of S line of Sec. 31, T 1 N, R 1 E, 1st P. M., part of said lands being known as Guard's Island and called in the records of the original survey "Sampson's Island."

(See Vol. 2, p. 95, State Auditor of Lands, Columbus.)

MIAMI TOWNSHIP

Such lands in F R 2, T 1, M.R's, Miami Township, are located in Fractional Sections 6, 11, 12, 17, 18, 21, 22, 23, 24, 27, 31, 32, and 33 as follows:

Fractional Section 6

All lands in Frac. Sec. 6, F R 2, T 1, M.R's, lying W of E line of first highway E of Miami River, sometimes known as Miami River Road.

Fractional Section 11

All lands in Frac. Sec. 11, F R 2, T 1, M.R's, lying N of S line of first highway E of Miami River, sometimes known as Miami River Road.

Fractional Section 12

All lands in Frac. Sec. 12, F R 2, T 1, M.R's, lying N and W of E line of first highway E of Miami River, sometimes known as Miami River Road.

Fractional Section 17

All lands in Frac. Sec. 17, F R 2, T 1, M.R's, lying N of S line of first highway S of Miami River.

Fractional Section 18

All lands in Frac. Sec. 18, F R 2, T 1, M.R's.

Fractional Section 21

All lands in Frac. Sec. 21, F R 2, T 1, M.R's, lying W of W corporation line of the Municipal Corporation of Cleves, excepting those lands included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 21; thence N 245 feet more or less along W line of said fractional section to point on S line of highway; thence E 1370 feet more or less along said S line of highway to point on said corporation line; thence S 135 feet more or less along said corporation line to point on S line of said fractional section; thence W 1350 feet more or less along said S line to place of beginning.

Fractional Section 22

The following lands in Frac. Sec. 22, F R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 22, 1315 feet W of NE corner thereof; thence S 0° 40′ W 2085 feet more or less to point on E line of highway; thence S 3650 feet more or less along said E line of highway to point on S line of said fractional section; thence W 2175 feet more or less along said S line to point on center line of Miami River; thence northerly 6300 feet more or less along center line of said river to point on N line of said fractional section; thence E 275 feet more or less along said N line to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, F R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 23; thence S 855 feet along E line of said fractional section; thence N 82° 40′ W 2020 feet; thence S 74° 00′ W

1195 feet; thence S 58° 00′ W 1155 feet; thence S 10° 15′ W 1185 feet; thence S 52° 50′ E 1355 feet; thence S 66° 05′ E 1375 feet; thence S 21° 00′ E 1190 feet more or less to point on S line of said fractional section; thence W 235 feet more or less along said S line to point on center line of Miami River; thence northerly 7950 feet more or less along center line of said river to point on N line of said fractional section; thence E 3450 feet more or less along said N line to place of beginning.

Fractional Section 24

All lands in Frac. Sec. 24, F R 2, T 1, M.R's.

Fractional Section 27

All lands in Frac. Sec. 27, F R 2, T 1, M.R's, lying N of S line of first highway S of Miami River.

Fractional Section 31

All lands in Frac. Sec. 31, F R 2, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 31; thence S 5360 feet more or less along E line of said fractional section to SE corner thereof; thence W 4010 feet along S line of said fractional section; thence N 33° 55′ E 870 feet; thence N 65° 10′ E 840 feet; thence N 84° 00′ W 685 feet; thence N 17° 45′ E 1065 feet; thence N 73° 55′ E 910 feet; thence S 84° 00′ E 545 feet; thence N 27° 00′ E 325 feet; thence N 87° 35′ W 1225 feet; thence N 1° 30′ W 745 feet; thence N 13° 00′ W 2000 feet more or less to point on N line of said fractional section; thence E 3655 feet more or less along said N line to place of beginning.

Fractional Section 32

All lands in Frac. Sec. 32, F R 2, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at NE corner of said fractional section; thence S 5280 feet more or less along E line of said fractional section to SE corner thereof; thence W 3635 feet along S line of said fractional section; thence N 3° 00′ E 1570 feet; thence N 21° 00′ E 660 feet; thence N 35° 10′ E 205 feet more or less to point on W line of highway; thence northerly 4400 feet more or less along said W line of highway to point on N line of said fractional section; thence E 135 feet more or less along said N line to place of beginning.

Fractional Section 33

All lands in Frac. Sec. 33, F R 2, T 1, M.R's, lying N and W of N line of first highway S of Miami River.

MIAMI TOWNSHIP

Such lands in F R 1, T 1, M.R's, Miami Township, are located in Fractional Sections 5 and 6 as follows:

Fractional Section 5

All lands in W ½ of Frac. Sec. 5, F R 1, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at N ¼ corner of Frac. Sec. 5; thence S 1010 feet along E line of NW ¼ of said fractional section; thence N 78° 10′ W 1290 feet; thence N

31° 15′ W 985 feet more or less to point on N line of said fractional section; thence E 1810 feet more or less along said N line to place of beginning.

Fractional Section 6

All lands in Frac. Sec. 6, F R 1, T 1, M.R's, excepting those lands included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 6; thence W 4010 feet along S line of said fractional section; thence N 3° 30′ W 740 feet; thence N 51° 20′ E 1360 feet; thence N 71° 10′ E 2625 feet; thence N 52° 00′ E 945 feet more or less to point on E line of said fractional section; thence S 3240 feet more or less along said E line to place of beginning.

MIAMI RIVER

All of the bed, banks, and islands of the Miami River, within the limits of The Miami Conservancy District, together with all riparian rights included therein, lying S of the center line of the first highway bridge across the Miami River N of the mouth of Loramie Creek, and lying N of the extended S line of Frac. Sec. 27, T 5 N, R 6 E, 1st P. M.

Also all of the bed, banks, and islands of the Miami River, within the limits of The Miami Conservancy District, together with all riparian rights included therein, lying S of a line 820 feet N of, and parallel with the S line of Frac. Sec. 23, T 3 N, R 6 E, 1st P. M.

PROPERTY OUTSIDE THE DISTRICT WHICH WILL BE AFFECTED

Lands not included within the present limits of The Miami Conservancy District, and which it is recommended be included within the District, are located and described as follows:

PROPERTY TO BE DAMAGED OR TAKEN

Lands not included within the present limits of The Miami Conservancy District, in all cases including all public and private property, rights, franchises, and public utility holdings thereon, which may be damaged by the works of the District, or which it may be necessary for the District to take for the purposes of the District, are located in Shelby, Miami, Montgomery, Greene, and Butler Counties, as follows: (Refer to Exhibits Nos. 5, 7, 11, and 14, which are hereby made a part of the following descriptions.)

SHELBY COUNTY

Such lands in Shelby County are located in Loramie Township as follows:

LORAMIE TOWNSHIP

Such lands in T 9 N, R 5 E, 1st P. M., Loramie Township, are located in Section 8 as follows: (Refer to Sheet No. 18 of Exhibit No. 5.)

Section 8

The following lands in Sec. 8, T 9 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of NE ¼ of Sec. 8; thence W 380 feet along S line of NE ¼ of said section; thence N 5° 00′ E 550 feet; thence N 35° 00′ W 160 feet; thence N 77° 40′ W 280 feet; thence N 7° 40′ W 400 feet; thence N 56° 00′ E 110 feet; thence N 25° 40′ E 210 feet; thence N 6° 10′ W 120 feet; thence N 68° 00′ E 70 feet; thence S 20° 30′ E 250 feet; thence S 14° 00′ W 390 feet; thence S 84° 40′ E 350 feet; thence S 42° 00′ E 240 feet more or less to point on E line of said section; thence S 700 feet more or less along E line of said section to place of beginning.

MIAMI COUNTY

Such lands in Miami County are located in Spring Creek and Bethel Townships as follows:

SPRING CREEK TOWNSHIP

Such lands in R 12, T 1, M.R's, Spring Creek Township, are located in Section 31 as follows: (Refer to Sheet No. 10 of Exhibit No. 7.)

Fractional Section 31

The following lands in Frac. Sec. 31, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at a point on N line of S ½ of SE ¼ of Frac. Sec. 31, 85 feet W of W line of highway, said highway being extension of N Main Street of the Municipal Corporation of Piqua; thence N 65° 35′ W 18 feet more or less to point on W line of Lot 70 of Johnson's Addition; thence NW 138 feet more or less along W line of said lot to point on S line of Lot 40 of said addition; thence SW 53 feet more or less along S line of said Lot 40 to SW corner thereof; thence NW 292 feet more or less along W line of Lots 40, 39, 38, 37, and 36, of said addition, to point on S line of Lot 102 of said addition; thence SW 7 feet more or less along S line of said Lot 102 to SW corner thereof; thence NW 45 feet more or less along W line of said lot to point where said W line intersects N line of Johnson Street (Vacated); thence SW 25 feet along N line of Johnson Street (Vacated); thence N 28° 10′ W 255 feet more or less to point on N line of Lot 48 of said addition; thence SW 20 feet more or less along N line of said Lot 48 to NW corner thereof; thence northwesterly 477 feet more or less to SW corner of 1.10-acre tract owned by Fred and Harry Phillipi; thence NW 395 feet more or less to a point on E bank of Miami River, said point being the NW corner of a 1.25-acre tract owned by Jno. Maroney; thence southeasterly 1375 feet more or less along said E bank to point on N line of S ½ of SE ¼ of said fractional section; thence E 490 feet more or less along said N line to place of beginning.

BETHEL TOWNSHIP

Such lands in R 9, T 2, M.R's, Bethel Township, are located in Section 12 as follows: (Refer to Sheet No. 25 of Exhibit No. 5.)

Section 12

The following lands in Sec. 12, R 9, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at a point on the W line of Sec. 12, 1300 feet N of the SW corner thereof; thence N 145 feet along W line of said section; thence N 50° 45′ E 230 feet; thence S 43° 35′ E 190 feet; thence S 75° 00′ E 325 feet; thence S 47° 00′ E 270 feet; thence S 70° 00′ E 530 feet; thence S 43° 15′ E 600 feet; thence S 8° 00′ W 70 feet; thence N 77° 30′ W 350 feet; thence N 58° 30′ W 720 feet; thence N 87° 10′ W 185 feet; thence S 57° 30′ W 370 feet; thence N 18° 00′ W 500 feet; thence northwesterly 140 feet more or less to place of beginning.

MONTGOMERY COUNTY

Such lands in Montgomery County are located in German and Miami Townships as follows:

GERMAN TOWNSHIP

Such lands in T 3 N, R 4 E, 1st P. M., German Township, are located in Sections 9 and 10 as follows: (Refer to Sheet No. 2 of Exhibit No. 5.)

Section 9

The following lands in Sec. 9, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 9, 2215 feet S of NE corner thereof; thence S 435 feet more or less along E line of said section to SE corner of NE ¼ thereof; thence W 75 feet along S line of NE ¼ of said section; thence S 23° 50′ W 350 feet; thence S 36° 10′ W 645 feet; thence S 86° 00′ W 285 feet; thence N 30° 20′ E 620 feet; thence N 72° 30′ W 140 feet; thence N 43° 25′ E 520 feet; thence N 22° 15′ W 105 feet; thence northeasterly 475 feet more or less to place of beginning.

Section 10

The following lands in Sec. 10, T 3 N, R 4 E, 1st P. M., to-wit:
All lands in the SW ¼ of NW ¼ of Sec. 10 and in S ½ of said section.

MIAMI TOWNSHIP

Such lands in T 2 N, R 5 E, 1st P. M., Miami Township, are located in Sections 3 and 10 as follows: (Refer to Sheets Nos. 3 and 4 of Exhibit No. 11.)

Fractional Section 3

The following lands in Frac. Sec. 3, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Municipal Corporation of Miamisburg with N line of 15.76-acre tract owned by W. H. Albrecht et al.; thence S 55 feet along said W corporation line; thence S 84° 55′ W 140 feet; thence S 88° 50′ W 350 feet; thence N 88° 50′ W 465 feet; thence N 7° 25′ W 45 feet more or less to point on extended N line of said 15.76-acre tract; thence E 970 feet more or less along said extended N line to place of beginning.

Fractional Section 10

The following lands in Frac. Sec. 10, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of S line of highway with W right-of-way line of C. H. & D. Ry. Co., said highway being approximately 1200 feet N of S line of Frac. Sec. 10; thence W 375 feet along S line of said highway; thence due N 30 feet more or less to point on N line of highway; thence N 81° 45′ E 160 feet more or less to point on W line of highway; thence northerly 100 feet along W line of highway; thence S 72° 00′ E 30 feet more or less to point on E line of highway; thence S 14° 40′ W 85 feet; thence N 89° 00′ E 190 feet more or less to point on said W right-of-way line; thence southerly 50 feet more or less along said right-of-way line to place of beginning.

GREENE COUNTY

Such lands in Greene County are located in Bath Township, as follows:

BATH TOWNSHIP

Such lands in R 8, T 3, M.R's, Bath Township, are located in Sections 21 and 28 as follows: (Refer to Sheet No. 34 of Exhibit No. 5.)

Section 21

The following lands in Sec. 21, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 21, 2120 feet N of SW corner thereof; thence S 59° 40′ E 180 feet; thence S 50° 00′ W 180 feet; thence S 58° 30′ E 440 feet; thence N 76° 00′ E 150 feet; thence N 44° 30′ E 390 feet; thence S 65° 15′ E 475 feet; thence S 1° 45′ E 110 feet; thence N 76° 00′ W 490 feet; thence S 24° 30′ W 290 feet; thence S 84° 30′ E 280 feet; thence N 82° 30′ E 740 feet; thence N 49° 45′ E 635 feet; thence N 82° 30′ E 280 feet; thence N 56° 50′ E 200 feet; thence N 84° 15′ E 190 feet more or less to point on E line of SW ¼ of said section; thence S 360 feet along E line of SW ¼ of said section; thence S 55° 00′ W 565 feet; thence S 63° 15′ W 1050 feet more or less to point on N line of highway; thence westerly 1470 feet more or less along N line of said highway to point on W line of said section; thence N 695 feet more or less along W line of said section to place of beginning.

Section 28

The following lands in Sec. 28, R 8, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at N ¼ corner of Sec. 28; thence E 1440 feet along N line of said section; thence S 10° 20′ W 2050 feet; thence S 18° 05′ E 1850 feet; thence S 0° 45′ E 1690 feet more or less to point on S line of said section; thence W 2090 feet more or less along S line of said section to S ¼ corner thereof; thence N 3895 feet more or less along W line of E ½ of said section to point on corporation line of the Municipal Corporation of Osborn; thence northeasterly 405 feet more or less along said corporation line to E corner of said corporation; thence northwesterly 350 feet more or less along corporation line to point on W line of E ½ of said section; thence N 975 feet more or less along W line of E ½ of said section to place of beginning.

BUTLER COUNTY

Such lands in Butler County are located in Madison Township as follows:

MADISON TOWNSHIP

Such lands in T 2 N, R 4 E, 1st P. M., Madison Township, are located in Fractional Sections 15 and 22 as follows: (Refer to Sheet No. 9 of Exhibit No. 14.)

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 15, 1222 feet more or less E of SW corner thereof, said point being also on E line of highway; thence N 140 feet along E line of highway; thence S 82° 00′ W 30 feet more or less to point on W line of highway; thence N 51° 45′ W 80 feet; thence N 46° 00′ E 70 feet more or less to point on W line of highway; thence N 82° 30′ E 30 feet more or less to point on E line of highway; thence S 72° 20′ E 110 feet; thence S 7° 00′ E 200 feet more or less to point on S line of said fractional section; thence W 100 feet more or less along said S line to place of beginning.

Fractional Section 22

The following lands in Frac. Sec. 22, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 22, 1222 feet more or less E of NW corner thereof, said point being also on E line of highway; thence E 100 feet along said N line; thence S 7° 00′ E 448 feet; thence southwesterly 50 feet more or less to NE corner of Lot 30 of Village of West Middletown; thence S 200 feet along E line of Lots 30, 31, 32, and 33; thence S 46° 30′ E 80 feet; thence S 33° 30′ W 60 feet; thence N 67° 30′ W 40 feet; thence S 1° 30′ E 365 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 240 feet along said W right-of-way line; thence southwesterly 28 feet more or less to SE corner of Lot 77; thence W 204 feet more or less along S line of Lot 77 to point on E line of highway; thence N 95 feet along E line of highway; thence S 79° 45′ E 225 feet; thence N 2° 25′ W 550 feet; thence S 85° 30′ W 30 feet more or less to point on W line of highway; thence N 50 feet more or less along W line of highway to highway corner; thence NW 26 feet along S line of highway; thence N 30° 00′ E 40 feet more or less to point on N line of highway; thence SE 30 feet more or less along N line of highway to highway corner; thence N 160 feet along W line of highway; thence N 84° 10′ W 290 feet more or less to point on E line of highway; thence N 60 feet along E line of highway; thence N 88° 30′ E 315 feet more or less to point on E line of highway; thence N 390 feet more or less along E line of highway to place of beginning.

PROPERTY TO BE BENEFITED

Lands not included within the present limits of The Miami Conservancy District, in all cases including all public and private property, rights, franchises, and public utility holdings thereon, that will be benefited by the works of the District, are located in Miami, Montgomery, Warren, Butler, and Hamilton Counties, as follows: (Refer to Exhibit No. 17, which is hereby made a part of the following descriptions.)

MIAMI COUNTY

Such lands in Miami County are located in Spring Creek and Staunton Townships as follows:

SPRING CREEK TOWNSHIP

Such lands in R 12, T 1, M.R's, Spring Creek Township, are located in Fractional Section 31 as follows: (Refer to Sheet No. 7 of Exhibit No. 17.)

Fractional Section 31

The following lands in Frac. Sec. 31, R 12, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of E ½ of Frac. Sec. 31, 1315 feet S of N ¼ corner of said fractional section; thence S 32° 50′ E 1225 feet; thence N 55° 25′ E 730 feet; thence S 32° 10′ E 980 feet; thence S 1° 20′ W 540 feet; thence S 49° 00′ E 240 feet; thence N 66° 05′ E 600 feet; thence S 22° 05′ W 790 feet; thence S 25° 50′ E 215 feet more or less to point on S line of N ½ of SE ¼ of said fractional section; thence W 1800 feet more or less along

said S line to point on E bank of Miami River; thence northerly 1800 feet more or less along E bank of said river to point on W line of E ½ of said fractional section; thence N 1050 feet more or less along said W line to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 11, T 1, M.R's, Staunton Township, are located in Section 13 as follows: (Refer to Sheet No. 9 of Exhibit No. 17.)

Section 13

The following lands in Sec. 13, R 11, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 13; thence N 930 feet along W line of said section; thence S 50° 25′ E 770 feet; thence S 18° 35′ E 515 feet more or less to point on S line of said section; thence W 800 feet more or less along said S line to place of beginning.

STAUNTON TOWNSHIP

Such lands in R 10, T 1, M.R's, Staunton Township, are located in Fractional Section 11 and in Section 18 as follows: (Refer to Sheets Nos. 9 and 10 of Exhibit No. 17.)

Fractional Section 11

All lands in E ½ of Frac. Sec. 11, R 10, T 1, M.R's, lying W of W line of first highway E of Miami River.

Section 18

The following lands in Sec. 18, R 10, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 18; thence E 795 feet along N line of said section; thence S 12° 05′ E 4040 feet; thence S 60° 10′ E 3175 feet more or less to point on S line of said section; thence W 1160 feet along said S line; thence N 3° 50′ W 160 feet; thence N 72° 40′ W 1020 feet; thence N 50° 50′ W 1255 feet; thence N 30° 00′ W 1520 feet; thence N 5° 05′ W 1520 feet; thence N 72° 40′ W 510 feet more or less to point on W line of said section; thence N 1235 feet more or less along said W line to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SE corner of said section; thence W 150 feet along S line of said section; thence N 52° 10′ W 865 feet; thence N 64° 05′ E 550 feet; thence S 28° 30′ E 730 feet more or less to point on E line of said section; thence S 140 feet more or less along said E line to place of beginning.

MONTGOMERY COUNTY

Such lands in Montgomery County are located in Harrison, Jefferson, German, and Miami Townships as follows:

HARRISON TOWNSHIP

Such lands in T 2 N, R 6 E, 1st P. M., Harrison Township, are located in Section 9 as follows: (Refer to Sheet No. 19 of Exhibit No. 17.)

Section 9

The following lands in Sec. 9, T 2 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of highway sometimes known as Fredericksburg Pike, 2475 feet E and 370 feet more or less S of NW corner of Sec. 9; thence N 83° 15′ E 870 feet; thence S 26° 50′ W 765 feet more or less to point on said E line of highway; thence northwesterly 790 feet more or less along said E line of highway to place of beginning.

HARRISON TOWNSHIP

Such lands in T 1 N, R 6 E, 1st P. M., Harrison Township, are located in Sections 5 and 7, and in Fractional Sections 8, 17, and 18 as follows: (Refer to Sheet No. 35 of Exhibit No. 17.)

Section 5

The following lands in Sec. 5, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 5, 1150 feet E of SW corner thereof; thence N 20° 15′ E 1510 feet; thence N 39° 30′ E 1545 feet more or less to point on corporation line of Municipal Corporation of Dayton; thence S and E 2395 feet more or less along said corporation line to point on W right-of-way line of C. H. & D. Ry. Co.; thence SW 1910 feet more or less along said W right-of-way line to point on S line of said section; thence W 1855 feet more or less along said S line to place of beginning.

Section 7

The following lands in Sec. 7, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 7; thence W 1125 feet along S line of said section; thence N 10° 15′ W 1070 feet; thence N 52° 40′ E 1305 feet; thence N 18° 55′ W 850 feet; thence N 33° 40′ E 725 feet more or less to point on E line of said section; thence S 3230 feet more or less along said E line to place of beginning.

Fractional Section 8

The following lands in Frac. Sec. 8, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 8; thence N 3285 feet along W line of said fractional section; thence N 3° 50′ E 1370 feet; thence N 35° 00′ E 635 feet; thence N 88° 50′ E 165 feet; thence S 14° 35′ W 680 feet; thence N 69° 25′ E 600 feet; thence N 20° 20′ E 595 feet more or less to point on N line of said fractional section; thence E 1710 feet more or less along said N line to point on W right-of-way line of C. H. & D. Ry. Co.; thence southerly 5940 feet more or less along said W right-of-way line to point on S line of said fractional section; thence W 245 feet more or less along said S line to place of beginning.

Fractional Section 17

All lands in Frac. Sec. 17, T 1 N, R 6 E, 1st P. M., lying W of W right-of-way line of C. H. & D. Ry. Co.

Fractional Section 18

The following lands in Frac. Sec. 18, T 1 N, R 6 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 18; thence S 600 feet more or less along E line of said fractional section to point on W right-of-way line of C. H. & D. Ry. Co.; thence southerly 4540 feet more or less along said W right-of-way line to point 310 feet N of point of intersection of said W right-of-way line with S line of said fractional section; thence N 21° 05′ W 410 feet more or less to point on E line of highway; thence N 1350 feet along said E line of highway; thence N 7° 05′ W 1500 feet; thence N 7° 30′ E 1770 feet more or less to point on N line of said fractional section; thence E 1120 feet more or less along said N line to place of beginning.

JEFFERSON TOWNSHIP

Such lands in T 3 N, R 5 E, 1st P. M., Jefferson Township, are located in Fractional Section 25, and in Sections 26 and 27 as follows: (Refer to Sheet No. 38 of Exhibit No. 17.)

Fractional Section 25

The following lands in Frac. Sec. 25, T 3 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of Frac. Sec. 25 with W right-of-way line of C. H. & D. Ry. Co.; thence N 1545 feet along W line of said fractional section; thence S 46° 25′ E 700 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence southerly 1165 feet more or less along said W right-of-way line to place of beginning.

Section 26

The following lands in Sec. 26, T 3 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of E line of Sec. 26 with W right-of-way line of C. H. & D. Ry. Co.; thence S 100 feet along said W right-of-way line; thence N 30° 40′ W 1315 feet; thence N 4° 15′ E 1175 feet; thence N 21° 50′ E 780 feet; thence S 30° 30′ E 545 feet more or less to point on E line of said section; thence S 2455 feet more or less along said E line to place of beginning.

Also the following lands in said section, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 26; thence N 575 feet along W line of said section; thence N 53° 20′ E 1820 feet; thence S 59° 40′ E 1185 feet; thence N 38° 55′ E 2070 feet; thence S 67° 20′ E 1395 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 2170 feet more or less along said W right-of-way line to point on S line of said section; thence W 4175 feet more or less along said S line to place of beginning.

Section 27

The following lands in Sec. 27, T 3 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 27; thence W 820 feet along S line of said section; thence N 52° 30′ E 1015 feet more or less to point on E line of said section; thence S 575 feet more or less along said E line to place of beginning.

GERMAN TOWNSHIP

Such lands in T 3 N, R 4 E, 1st P. M., German Township, are located in Sections 11 and 14 as follows: (Refer to Sheet No. 46 of Exhibit No. 17.)

Section 11

The following lands in Sec. 11, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of W ½ of SW ¼ of Sec. 11; thence S 1335 feet along E line of said W ½; thence N 23° 30′ W 1460 feet more or less to point on N line of said W ½; thence E 600 feet more or less along N line of said W ½ to place of beginning.

Section 14

The following lands in Sec. 14, T 3 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at N ¼ corner of Sec. 14; thence S 1660 feet along E line of W ½ of said section; thence N 56° 00′ W 310 feet; thence N 40° 20′ W 1240 feet; thence N 15° 20′ W 540 feet more or less to point on N line of said section; thence E 1190 feet more or less along N line of said section to place of beginning.

MIAMI TOWNSHIP

Such lands in T 3 N, R 5 E, 1st P. M., Miami Township, are located in Sections 33 and 34, and in Fractional Section 35 as follows: (Refer to Sheets Nos. 38 and 39 of Exhibit No. 17.)

Section 33

The following lands in Sec. 33, T 3 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 33; thence S 1210 feet along E line of said section; thence N 58° 15′ W 1230 feet; thence N 47° 15′ E 800 feet more or less to point on N line of said section; thence E 425 feet more or less along N line of said section to place of beginning.

Section 34

The following lands in Sec. 34, T 3 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 34; thence E 1085 feet along N line of said section; thence S 41° 05′ E 1815 feet; thence S 6° 30′ W 970 feet; thence S 46° 25′ E 375 feet; thence N 28° 10′ E 675 feet; thence N 44° 05′ E 1295 feet; thence N 32° 50′ E 1410 feet more or less to point on N line of said section; thence E 815 feet more or less along N line of said section to NE corner thereof; thence S 5345 feet more or less along E line of said section to SE corner thereof; thence W 1805 feet along S line of said section; thence N 36° 20′ W 790 feet; thence N 49° 20′ W 905 feet; thence N 30° 45′ W 1640 feet; thence N 43° 30′ W 890 feet; thence N 66° 15′ W 1065 feet more or less to point on W line of said section; thence N 1500 feet more or less along said W line to place of beginning.

Fractional Section 35

All lands in Frac. Sec. 35, T 3 N, R 5 E, 1st P. M., lying W of W right-of-way line of C. H. & D. Ry. Co.

MIAMI TOWNSHIP

Such lands in T 2 N, R 5 E, 1st P. M., Miami Township, are located in Fractional Sections 2, 3, 10, and 15 as follows: (Refer to Sheets Nos. 39 and 42 of Exhibit No. 17.)

Fractional Section 2

All lands in Frac. Sec. 2, T 2 N, R 5 E, 1st P. M., lying W of W right-of-way line of C. H. & D. Ry. Co., excepting those lands included within the corporate limits of Municipal Corporation of Miamisburg.

Fractional Section 3

The following lands in Frac. Sec. 3, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 3; thence S 2730 feet more or less along E line of said fractional section to point on corporation line of Municipal Corporation of Miamisburg; thence S and W 2260 feet more or less along said corporation line to point on N line of highway; thence W 85 feet along N line of said highway; thence N 14° 30′ W 1870 feet; thence N 8° 10′ E 450 feet; thence N 12° 50′ W 1330 feet; thence N 25° 00′ W 595 feet more or less to point on N line of said fractional section; thence E 1805 feet more or less along said N line to place of beginning.

Fractional Section 10

The following lands in Frac. Sec. 10, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W right-of-way line of C. H. & D. Ry. Co. with S line of Frac. Sec. 10; thence W 770 feet along S line of said fractional section; thence N 8° 15′ E 590 feet; thence N 5° 45′ W 610 feet; thence N 22° 00′ E 1170 feet; thence northeasterly 1040 feet more or less to corporation corner of Municipal Corporation of Miamisburg; thence E 610 feet more or less along corporation line to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 3000 feet more or less along said W right-of-way line to place of beginning.

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 5 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 15 with W right-of-way line of C. H. & D. Ry. Co.; thence southerly 1930 feet along said W right-of-way line; thence N 53° 50′ W 430 feet; thence N 35° 10′ W 1060 feet; thence N 1° 10′ W 785 feet more or less to point on N line of said fractional section; thence E 780 feet more or less along said N line to place of beginning.

MIAMI TOWNSHIP

Such lands in R 6, T 1, M.R's, Miami Township, are located in Sections 9, 10, and 15, and in Fractional Sections 16 and 21 as follows: (Refer to Sheet No. 36 of Exhibit No. 17.)

Section 9

The following lands in Sec. 9, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 9; thence E 1190 feet along N line of said section; thence S 63° 30′ W 1350 feet more or less to point on W line of said section; thence N 680 feet more or less along said W line to place of beginning.

Section 10

The following lands in Sec. 10, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 10; thence N 2345 feet along W line of said section; thence S 88° 15′ E 745 feet; thence S 1° 50′ W 1435 feet; thence S 21° 20′ E 1045 feet more or less to point on S line of said section; thence W 1190 feet more or less along said S line to place of beginning.

Section 15

The following lands in Sec. 15, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 15; thence S 1035 feet along E line of said section; thence S 37° 30′ W 1060 feet; thence S 12° 00′ E 1055 feet; thence S 20° 00′ W 1050 feet; thence S 50° 05′ W 1445 feet; thence S 68° 50′ W 1740 feet; thence S 8° 00′ W 405 feet; thence N 72° 50′ W 900 feet; thence S 85° 30′ W 1045 feet more or less to point on W line of said section; thence N 3175 feet more or less along said W line to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence northeasterly 3410 feet more or less along said E right-of-way line to point on N line of said section; thence NE 2520 feet more or less along said N line to place of beginning.

Fractional Section 16

All lands in Frac. Sec. 16, R 6, T 1, M.R's, lying E of E right-of-way line of C. C. C. & St. L. Ry. Co.

Fractional Section 21

The following lands in Frac. Sec. 21, R 6, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of S right-of-way line of C. C. C. & St. L. Ry. Co. with E line of Frac. Sec. 21; thence S 3175 feet along said E line; thence S 85° 30′ W 730 feet; thence N 82° 10′ W 1455 feet; thence N 66° 00′ W 1340 feet; thence N 83° 15′ W 1210 feet more or less to point on corporation line of Municipal Corporation of West Carrollton; thence northeasterly 4100 feet more or less along said corporation line to the most easterly corner of said corporation; thence S 30° 00′ E 20 feet more or less to point on S right-of-way line of C. C. C. & St. L. Ry. Co.; thence NE 1600 feet more or less along said E right-of-way line to place of beginning.

MIAMI TOWNSHIP

Such lands in R 5, T 2, M.R's, Miami Township, are located in Fractional Section 36 as follows: (Refer to Sheet No. 42 of Exhibit No. 17.)

Fractional Section 36

The following lands in Frac. Sec. 36, R 5, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of E right-of-way line of C. C. C. &

St. L. Ry. Co. with S line of Frac. Sec. 36; thence northerly 3110 feet along said E right-of-way line; thence S 18° 25′ E 2140 feet; thence S 3° 20′ W 1045 feet more or less to point on S line of said fractional section; thence W 125 feet more or less along S line of said fractional section to place of beginning.

WARREN COUNTY

Such lands in Warren County are located in Franklin Township as follows:

FRANKLIN TOWNSHIP

Such lands in R 5, T 2, M.R's, Franklin Township, are located in Fractional Section 31 as follows: (Refer to Sheet No. 43 of Exhibit No. 17.)

Fractional Section 31

The following lands in Frac. Sec. 31, R 5, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of corporation line of Municipal Corporation of Franklin with S line of Lot 1002 of Van Camp Addition; thence southeasterly 115 feet to point on S line of Lot 1010; thence S 9° 20′ E 670 feet; thence northeasterly 360 feet more or less to NW corner of Lot 1030 of said addition; thence N 80° 10′ E 200 feet more or less tc point on E line of street; thence S 62° 25′ E 515 feet; thence S 51° 20′ W 350 feet; thence S 21° 35′ E 625 feet; thence N 76° 50′ W 1180 feet; thence N 45° 50′ W 325 feet; thence S 65° 15′ W 1550 feet more or less to point on corporation line of said corporation; thence northeasterly 2820 feet more or less along said corporation line to place of beginning.

BUTLER COUNTY

Such lands in Butler County are located in Madison, Lemon, Saint Clair, Liberty, and Ross Townships, as follows:

MADISON TOWNSHIP

Such lands in T 2 N, R 4 E, 1st P. M., Madison Township, are located in Fractional Sections 11, 12, 15, 22, 28, and 32, and in Section 21, as follows: (Refer to Sheets Nos. 49, 50, and 54 of Exhibit No. 17.)

Fractional Section 11

The following lands in Frac. Sec. 11, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 11, 130 feet S of NE corner thereof; thence S 1415 feet more or less along said E line to point on W right-of-way line of C. H. & D. Ry. Co.; thence SW 2930 feet along said W right-of-way line; thence N 33° 30′ E 1200 feet; thence N 29° 00′ W 1170 feet; thence N 35° 40′ E 420 feet; thence S 78° 20′ E 425 feet; thence N 57° 00′ E 1235 feet; thence easterly 590 feet more or less to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on W right-of-way line of C. H. & D. Ry. Co., 1490 feet N and 1700 feet more or less E of SW corner of Frac. Sec. 11; thence N 23° 35′ W 550 feet; thence N 6° 30′ E 640 feet; thence S 69° 05′ E 520 feet; thence S 30° 20′ E 680 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence SW 610 feet more or less along said W right-of-way line to place of beginning.

Fractional Section 12

The following lands in Frac. Sec. 12, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W right-of-way line of C. H. & D. Ry. Co. with W line of Frac. Sec. 12; thence N 1415 feet along said W fractional section line; thence N 82° 30′ E 595 feet; thence S 71° 55′ E 1245 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence SW 2130 feet more or less along said W right-of-way line to place of beginning.

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 15, 970 feet E of SW corner thereof; thence N 2° 20′ E 340 feet; thence N 30° 00′ E 1555 feet; thence N 66° 10′ W 505 feet; thence N 63° 25′ E 930 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence southerly 2415 feet more or less along said W right-of-way line to point on S line of said fractional section; thence W 515 feet more or less along said S line to place of beginning.

Section 21

The following lands in Sec. 21, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 21; thence W 700 feet along S line of said section; thence N 24° 00′ E 450 feet; thence N 43° 00′ E 725 feet more or less to point on E line of said section; thence S 930 feet more or less along said E line to place of beginning.

Fractional Section 22

The following lands in Frac. Sec. 22, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 22, 940 feet E of NW corner thereof; thence S 21° 45′ W 320 feet more or less to point on N line of Lot 54 of West Middletown; thence S 55° 30′ W 190 feet; thence S 26° 50′ E 65 feet; thence S 87° 35′ E 110 feet; thence S 6° 30′ E 370 feet; thence S 9° 40′ E 1135 feet; thence S 5° 30′ W 430 feet; thence S 79° 30′ E 80 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence N 2570 feet more or less along said W right-of-way line to point on N line of said fractional section; thence W 555 feet more or less along said N line to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 22; thence N 930 feet along W line of said fractional section; thence N 43° 00′ E 1270 feet more or less to point on W right-of-way line of C. H. & D. Ry. Co.; thence S 2040 feet more or

less along said W right-of-way line to point on S line of said fractional section; thence W 35 feet more or less along said S line to place of beginning.

Fractional Section 28

The following lands in Frac. Sec. 28, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 28; thence S 20 feet more or less along E line of said fractional section to point on W right-of-way line of C. H. & D. Ry. Co.; thence SW 5150 feet more or less along said W right-of-way line to point on S right-of-way line of O. E. Ry. Co.; thence N 47° 20′ W 755 feet; thence due E 570 feet; thence N 22° 50′ E 430 feet; thence N 34° 35′ E 1255 feet more or less to point on W line of highway; thence N 2685 feet more or less along said W line of highway to point on N line of said fractional section; thence E 755 feet more or less along said N line to place of beginning.

Fractional Section 32

The following lands in Frac. Sec. 32, T 2 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Frac. Sec. 32, 1620 feet S of NE corner thereof; thence S 260 feet more or less along said E line to point on N right-of-way line of C. H. & D. Ry. Co.; thence SW 2715 feet along said right-of-way line; thence N 46° 10′ W 1345 feet more or less to point on S line of highway; thence N 47° 45′ E 1140 feet; thence N 38° 30′ W 1510 feet; thence N 42° 20′ E 200 feet; thence S 57° 40′ E 980 feet; thence southeasterly 2235 feet more or less to place of beginning.

MADISON TOWNSHIP

Such lands in T 1 N, R 4 E, 1st P. M., Madison Township, are located in Fractional Sections 5, 17, and 19, and in Sections 7 ,8, and 18 as follows: (Refer to Sheets Nos. 54 and 55 of Exhibit No. 17.)

Fractional Section 5

The following lands in Frac. Sec. 5, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 5, 110 feet E of SW corner thereof; thence N 27° 00′ E 960 feet; thence N 40° 20′ E 1075 feet more or less to point on W line of highway; thence S 1720 feet more or less along said W line of highway to point on S line of said fractional section; thence W 1640 feet more or less along said S line to place of beginning.

Section 7

The following lands in Sec. 7, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 7, 200 feet S of NE corner thereof; thence S 1620 feet along said E line; thence N 43° 10′ W 390 feet; thence N 1° 50′ E 960 feet; thence northerly 440 feet more or less to place of beginning.

Section 8

The following lands in Sec. 8, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 8, 115 feet E of NW corner thereof; thence E 1635 feet more or less along N line of said section to point on W line of N and S highway; thence S 5600 feet more or less along W line of said highway to point on S line of said section; thence W 1060 feet along said S line; thence N 2° 40′ W 1500 feet; thence N 43° 10′ W 2860 feet more or less to point on W line of said section; thence N 1620 feet along said W line; thence northeasterly 230 feet more or less to place of beginning.

Fractional Section 17

The following lands in Frac. Sec. 17, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 17, 1920 feet E of NW corner thereof; thence E 1095 feet more or less along said N line to point on W line of highway sometimes known as the Woodsdale and Trenton Road; thence S and W 4440 feet more or less along said W line of highway to point on W line of said fractional section; thence N 475 feet along W line of said fractional section; thence N 48° 50′ E 2320 feet; thence northerly 700 feet more or less to place of beginning.

Section 18

The following lands in Sec. 18, T 1 N, R 4 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of W line of highway sometimes known as Woodsdale and Trenton Road with S line of Sec. 18; thence W 1000 feet more or less along said S line to SW corner of said section; thence N 245 feet along W line of said section; thence N 44° 00′ E 1335 feet; thence N 66° 25′ E 3105 feet; thence N 50° 55′ E 1500 feet; thence S 62° 10′ E 365 feet more or less to point on E line of said section; thence S 475 feet more or less along E line of said section to point on N line of said highway; thence W and S 5190 feet more or less along N and W line of said highway to place of beginning.

Fractional Section 19

All lands in Frac. Sec. 19, T 1 N, R 4 E, 1st P. M., lying N and W of N and W line of highway sometimes known as Woodsdale and Trenton Road.

LEMON TOWNSHIP

Such lands in R 4, T 2, M.R's, Lemon Township, are located in Sections 25 and 26 as follows: (Refer to Sheets Nos. 50 and 54 of Exhibit No. 17.)

Section 25

The following lands in Sec. 25, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 25, 695 feet W of NE corner thereof; thence S 41° 30′ E 980 feet more or less to point on E line of said section; thence S 250 feet along E line of said section; thence N 77° 30′ W 580 feet; thence N 48° 10′ W 1025 feet; thence S 67° 40′ W 990 feet; thence S 18° 35′ E 720 feet; thence N 52° 05′ W 1760 feet; thence N 28° 00′ W 315 feet more or less to point on N line of said section; thence E 2935 feet more or less along N line of said section to place of beginning.

Section 26

The following lands in Sec. 26, R 4, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on S line of Sec. 26, 695 feet W of SE corner thereof; thence N 41° 40′ W 630 feet; thence S 82° 10′ W 730 feet; thence N 16° 40′ E 980 feet; thence S 72° 45′ W 850 feet more or less to point on N line of highway; thence NW 650 feet along said N line of highway; thence S 87° 25′ W 925 feet; thence N 50° 40′ E 940 feet; thence N 32° 35′ W 220 feet; thence S 69° 00′ W 435 feet more or less to point on W line of Lot 49 of Village of Amanda, sometimes known as Excello Post Office; thence northwesterly 110 feet more or less to SE corner of Lot 65 of said village; thence N 390 feet more or less to SE corner of Lot 73 of said village; thence N 72° 20′ E 430 feet; thence N 1° 20′ W 770 feet; thence N 52° 45′ E 510 feet; thence S 27° 00′ E 1240 feet; thence N 84° 20′ E 1285 feet; thence N 3° 10′ E 270 feet; thence N 23° 20′ W 865 feet; thence N 46° 35′ W 1560 feet more or less to point on E right-of-way line of C. H. & D. Ry. Co.; thence southwesterly 4335 feet along said E right-of-way line; thence S 65° 15′ E 1150 feet; thence S 28° 10′ E 590 feet more or less to point on S line of said section; thence E 2930 feet more or less along said S line to place of beginning.

LEMON TOWNSHIP

Such lands in R 3, T 3, M.R's, Lemon Township, are located in Fractional Section 35 as follows: (Refer to Sheet No. 55 of Exhibit No. 17.)

Fractional Section 35

The following lands in Frac. Sec. 35, R 3, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at SW corner of Frac. Sec. 35; thence N 2955 feet along W line of said fractional section; thence S 32° 45′ E 1000 feet more or less to point on W line of highway; thence N 62° 50′ E 700 feet; thence S 2° 50′ W 1080 feet; thence S 69° 00′ W 1060 feet; thence S 19° 40′ W 455 feet; thence S 68° 15′ E 1010 feet; thence S 38° 45′ E 290 feet more or less to point on S line of said fractional section; thence W 1245 feet more or less along S line of said fractional section to place of beginning.

LEMON TOWNSHIP

Such lands in R 3, T 2, M.R's, Lemon Township, are located in Fractional Section 5 as follows: (Refer to Sheet No. 55 of Exhibit No. 17.)

Fractional Section 5

The following lands in Frac. Sec. 5, R 3, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at SE corner of Frac. Sec. 5; thence W 640 feet along S line of said fractional section; thence N 6° 20′ W 2315 feet; thence S 85° 00′ W 1260 feet more or less to point on E right-of-way line of C. H. & D. Ry. Co.; thence northeasterly 2610 feet more or less along said E right-of-way line to point on E line of said fractional section; thence S 3400 feet more or less along E line of said fractional section to place of beginning.

SAINT CLAIR TOWNSHIP

Such lands in T 2 N, R 3 E, 1st P. M., Saint Clair Township, are located in Sections 9, 10, and 13 and in Fractional Sections 15, and 24 as follows: (Refer to Sheets Nos. 55, 56, and 57 of Exhibit No. 17.)

Section 9

The following lands in Sec. 9, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 9, 2015 feet S of NW corner thereof; thence S 84° 25′ E 415 feet; thence N 24° 45′ E 1000 feet; thence S 60° 45′ E 940 feet; thence N 50° 20′ E 830 feet; thence S 30° 35′ E 900 feet; thence N 89° 45′ E 2515 feet more or less to point on E line of said section; thence S 600 more or less along said E line to E ¼ corner of said section; thence W 5250 feet more or less along S line of N ½ of said section to W ¼ corner of said section; thence N 540 feet more or less along W line of said section to place of beginning.

Section 10

The following lands in Sec. 10, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 10; thence N 1480 feet along W line of said section; thence S 63° 50′ E 365 feet; thence S 14° 30′ W 760 feet; thence N 74° 50′ E 390 feet; thence S 21° 30′ W 740 feet more or less to point on S line of said section; thence W 240 feet more or less along said S line to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 10, 2140 feet S of NW corner thereof; thence N 83° 00′ E 1130 feet; thence S 23° 20′ W 430 feet; thence S 80° 30′ W 960 feet more or less to point on W line of said section; thence N 425 feet more or less along said W line to place of beginning.

Section 13

The following lands in Sec. 13, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 13; thence W 500 feet along S line of said section; thence N 63° 45′ E 550 feet more or less to point on E line of said section; thence S 240 feet more or less along said E line to place of beginning.

Fractional Section 15

The following lands in Frac. Sec. 15, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 15; thence E 350 feet along N line of said fractional section; thence S 29° 25′ W 345 feet; thence S 47° 15′ E 1380 feet; thence S 15° 20′ E 740 feet more or less to point on N right-of-way line of C. D. & T. Tr. Co.; thence SW 1475 feet more or less along said N right-of-way line to point on W line of said fractional section; thence N 2585 feet more or less along said W line to place of beginning.

Fractional Section 24

The following lands in Frac. Sec. 24, T 2 N, R 3 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 24; thence S 740 feet more or less along E line of said fractional section to point on N line of highway; thence W 5140 feet along said N line of highway; thence N 73° 20′ E 2005 feet; thence N 88° 50′ E 1925 feet; thence N 62° 20′ E 750 feet more or less to point on N line of said fractional section; thence E 630 feet more or less along N line of said fractional section to place of beginning.

LIBERTY TOWNSHIP

Such lands in R 3, T 3, M.R's, Liberty Township, are located in Section 34 as follows: (Refer to Sheet No. 55 of Exhibit No. 17.)

Section 34

The following lands in Sec. 34, R 3, T 3, M.R's, included within the lines described as follows, to-wit:

Beginning at NW corner of Sec. 34; thence E 1250 feet along N line of said section; thence S 38° 15′ E 500 feet; thence S 26° 00′ W 120 feet; thence N 69° 35′ W 640 feet; thence N 89° 20′ W 595 feet; thence S 34° 10′ W 625 feet more or less to point on W line of said section; thence N 845 feet more or less along W line of said section to place of beginning.

LIBERTY TOWNSHIP

Such lands in R 3, T 2, M.R's, Liberty Township, are located in Section 4 as follows: (Refer to Sheet No. 55 of Exhibit No. 17.)

Section 4

The following lands in Sec. 4, R 3, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 4; thence S 600 feet along E line of said section; thence N 56° 20′ W 525 feet; thence N 36° 45′ W 280 feet; thence N 6° 20′ W 110 feet more or less to point on N line of said section; thence E 640 feet more or less along N line of said section to place of beginning.

ROSS TOWNSHIP

Such lands in T 3 N, R 2 E, 1st P. M., Ross Township, are located in Sections 22, 27, 32, and 33, and in Fractional Sections 23, and 34 as follows: (Refer to Sheets Nos. 67 and 68 of Exhibit No. 17.)

Section 22

The following lands in Sec. 22, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 22; thence S 2805 feet along E line of said section; thence N 56° 20′ W 410 feet; thence N 41° 00′ W 1300 feet; thence N 15° 00′ E 1635 feet more or less to point on N line of said section; thence E 740 feet more or less along said N line to place of beginning.

Fractional Section 23

The following lands in Frac. Sec. 23, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point where W line of highway, sometimes known as Oxford Pike, intersects W line of Frac. Sec. 23; thence N 3130 feet along W line of said fractional section; thence S 34° 20′ E 1050 feet; thence S 4° 00′ E 1820 feet more or less to point on W line of said highway; thence southwesterly 820 feet more or less along said W line of highway to place of beginning.

Section 27

The following lands in Sec. 27, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point where W line of second highway W of Miami River, sometimes known as Oxford Pike, intersects S line of Sec. 27; thence W 1195 feet along S line of said section; thence N 52° 30′ E 765 feet; thence southeasterly 735 feet more or less to place of beginning.

Section 32

The following lands in Sec. 32, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SE corner of Sec. 32; thence W 1555 feet along S line of said section; thence N 9° 30′ E 250 feet; thence N 55° 35′ E 690 feet; thence N 87° 00′ E 935 feet more or less to point on E line of said section; thence S 690 feet more or less along said E line to place of beginning.

Section 33

The following lands in Sec. 33, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on E line of Sec. 33, 870 feet S of NE corner thereof; thence S 1540 feet more or less to point on extended N line of highway, sometimes known as Brookville Road; thence W 3670 feet along said extended N line of highway; thence N 42° 15′ E 1370 feet; thence N 84° 00′ E 1250 feet; thence N 41° 40′ E 750 feet; thence easterly 945 feet more or less to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, T 3 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point of intersection of N line of Frac. Sec. 34 with W line of second highway W of Miami River, sometimes known as Oxford Pike; thence SW 3385 feet more or less along said W line of highway to intersection with N line of highway sometimes known as Cincinnati Pike; thence NW 105 feet more or less along N line of Cincinnati Pike to point on W line of said fractional section; thence N 1720 feet along W line of said fractional section; thence N 77° 50′ E 620 feet; thence N 41° 30′ E 805 feet more or less to point on N line of said fractional section; thence E 1195 feet more or less along N line of said fractional section of place of beginning.

HAMILTON COUNTY

Such lands in Hamilton County are located within the corporate limits of the Municipal Corporation of Cleves and in Crosby, Colerain, Whitewater, Miami, and Green Townships as follows:

MUNICIPAL CORPORATION OF CLEVES

The following lands within the corporate limits of the Municipal Corporation of Cleves, included within the lines described as follows, to-wit: (Refer to Sheet No. 75 of Exhibit No. 17.)

Beginning at point of intersection of W line of Municipal Corporation of Cleves with S line of first highway S of Miami River; thence E 670 feet more or less along said S line of highway to point on S line of Frac. Sec. 21, F R 2, T 1, M. R's; thence E 920 feet along S line of said fractional section; thence S 47° 00′ W 275 feet; thence S 5° 05′ W 280 feet; thence S 77° 30′ W 420 feet; thence N 40° 00′ W 625 feet; thence N 64° 30′ W 575 feet more or less to point on said corporation line; thence N 95 feet more or less along said corporation line to place of beginning.

Also the following lands within said corporate limits included within the lines described as follows, to-wit:

Beginning at point of intersection of E line of Miami Avenue, of the Municipal Corporation of Cleves, with S line of Morgan Street; thence E 360 feet more or less along said S line of Morgan Street to point on E line of Spring Street; thence southwesterly 540 feet more or less to point of intersection of S line of Markland Street with E line of Miami Avenue; thence N 390 feet more or less along said E line of Miami Avenue to place of beginning.

CROSBY TOWNSHIP

Such lands in T 2 N, R 2 E, 1st P. M., Crosby Township, are located in Sections 7 and 8, and in Fractional Sections 16, 17, and 18, as follows: (Refer to Sheets Nos. 69 and 70 of Exhibit No. 17.)

Section 7

The following lands in Sec. 7, T 2 N, R 2 E, 1st P. M., included within the lines described as follows. to-wit:

Beginning at SE corner of Sec. 7; thence W 3200 feet along S line of said section; thence N 24° 50′ W 945 feet; thence N 40° 00′ E 1730 feet; thence N 5° 30′ W 365 feet; thence N 71° 55′ E 580 feet; thence S 29° 35′ E 800 feet; thence S 64° 00′ E 1640 feet more or less to point on E line of said section; thence S 1295 feet more or less along said E line to place of beginning.

Section 8

The following lands in Sec. 8, T 2 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at SW corner of Sec. 8; thence N 1295 feet along W line of said section; thence S 45° 40′ E 1810 feet more or less to point on S line of said section; thence W 1190 feet more or less along said S line to place of beginning.

Fractional Section 16

The following lands in Frac. Sec. 16, T 2 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on W line of first highway W of Miami River, 375 feet S of point of intersection of said W line of highway with N line of Frac. Sec. 16, said distance being measured along said W line of highway; thence southerly 5000 feet more or less along said W line of highway to point 115 feet E of point of intersection of said W line of highway with E line of Columbia Street of Village of New Baltimore; thence N 56° 40′ E 560 feet; thence N 21° 15′ E 1800 feet; thence northerly 1640 feet more or less to place of beginning.

Fractional Section 17

The following lands in Frac. Sec. 17, T 2 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NW corner of Frac. Sec. 17; thence E 1500 feet along N line of said fractional section; thence S 18° 00′ E 1520 feet; thence S 14° 50′ W 385 feet; thence S 30° 20′ E 1290 feet more or less to point on E line of highway; thence northwesterly 3840 feet more or less along said E line of highway to point on W line of said fractional section; thence N 50 feet more or less along said W line to place of beginning.

Fractional Section 18

The following lands in Frac. Sec. 18, T 2 N, R 2 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Frac. Sec. 18; thence S 625 feet more or less along E line of said fractional section to point on W line of highway; thence southerly 3150 feet along said W line of highway; thence N 12° 45′ W 840 feet; thence N 89° 10′ W 735 feet; thence N 58° 00′ E 695 feet; thence N 16° 50′ E 480 feet; thence N 45° 30′ W 1740 feet more or less to point on N line of said fractional section; thence E 3200 feet more or less along said N line to place of beginning.

COLERAIN TOWNSHIP

Such lands in R 2, T 1, M.R's, Colerain Township, are located in Fractional Section 25 as follows: (Refer to Sheet No. 67 of Exhibit No. 17.)

Fractional Section 25

The following lands in Frac. Sec. 25, R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of E line of first highway E of Miami River with E line of Frac. Sec. 25; thence S 80 feet along E line of said fractional section; thence S 40° 00′ W 2350 feet more or less to point on E line of said highway; thence N and E 2600 feet more or less along said E line of highway to place of beginning.

COLERAIN TOWNSHIP

Such lands in R 1, T 2, M.R's, Colerain Township, are located in Sections 31 and 33, and in Fractional Sections 29, 30, and 34, as follows: (Refer to Sheets Nos. 67, 69, 71, and 72 of Exhibit No. 17.)

Fractional Section 29

The following lands in Frac. Sec. 29, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 29, 2525 feet W of NE corner thereof; thence S 5° 30′ E 2260 feet; thence S 61° 10′ E 680 feet; thence S 26° 40′ W 750 feet more or less to point on E line of highway; thence northerly 3420 feet more or less along said E line of highway to point on N line of said fractional section; thence E 260 feet more or less along said N line to place of beginning.

Fractional Section 30

The following lands in Frac. Sec. 30, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of highway, 1830 feet W and 470 feet more or less S of NE corner of Frac. Sec. 30; thence S 16° 00′ W 1750 feet more or less to point on E line of highway; thence northerly 2240 feet more or less along said E line of highway to place of beginning.

Also the following lands in said fractional section included within the lines described as follows, to-wit:

Beginning at point on E line of highway, 2690 feet S and 2000 feet more or less W of NE corner of Frac. Sec. 30; thence N 65° 20′ E 725 feet; thence S 65° 00′ E 920 feet; thence S 68° 30′ W 875 feet; thence N 81° 00′ W 820 feet more or less to point on E line of highway; thence northerly 350 feet more or less along said E line of highway to place of beginning.

Section 31

The following lands in Sec. 31, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on W line of Sec. 31, 2200 feet N of SW corner thereof; thence N 360 feet along said W line; thence S 80° 25′ E 1140 feet; thence S 47° 30′ E 600 feet; thence N 79° 30′ E 625 feet; thence S 29° 15′ W 1150 feet; thence S 21° 00′ E 1280 feet more or less to point on S line of said section; thence W 635 feet along said S line; thence N 13° 55′ W 1085 feet; thence N 56° 25′ W 630 feet; thence N 21° 30′ E 775 feet; thence westerly 1000 feet more or less to place of beginning.

Section 33

The following lands in Sec. 33, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 33; thence S 1000 feet along E line of said section; thence N 34° 45′ W 1330 feet more or less to point on N line of said section; thence E 840 feet more or less along said N line to place of beginning.

Fractional Section 34

The following lands in Frac. Sec. 34, R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 34, 220 feet W of SE corner thereof; thence W 1030 feet along said S line; thence N 23° 20′ E 980 feet; thence N 87° 50′ W 575 feet; thence N 10° 15′ E 850 feet; thence N 70° 30′

W 1145 feet; thence N 47° 05′ W 1315 feet more or less to point on S line of highway sometimes known as Miami River Road or River Road; thence easterly 2700 feet more or less along said S line of highway to point 290 feet E from E line of Blue Rock Pike, said 290 feet being measured along S line of Miami River Road; thence S 4° 50′ E 1320 feet; thence southerly 1700 feet more or less to place of beginning.

COLERAIN TOWNSHIP

Such lands in R 1, T 1, M.R's, Colerain Township, are located in Fractional Section 1 as follows: (Refer to Sheet No. 72, of Exhibit No. 17.)

Fractional Section 1

The following lands in Frac. Sec. 1, R 1, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on S line of Frac. Sec. 1, 270 feet W of SE corner thereof; thence W 325 feet along said S line; thence N 20° 00′ W 1850 feet; thence S 45° 30′ W 1165 feet; thence S 87° 45′ W 765 feet more or less to point on E line of highway; thence NE 655 feet along said E line of highway; thence N 53° 25′ E 1730 feet; thence N 6° 25′ E 795 feet; thence S 34° 10′ E 945 feet; thence N 86° 35′ E 700 feet more or less to point on E line of said fractional section; thence S 355 feet along said E line; thence S 84° 30′ W 460 feet; thence S 46° 10′ E 320 feet; thence S 34° 05′ W 355 feet; thence S 81° 00′ W 605 feet; thence S 26° 30′ E 1190 feet; thence southerly 465 feet more or less to place of beginning.

WHITEWATER TOWNSHIP

Such lands in T 1 N, R 1 E, 1st P. M., Whitewater Township, are located in Sections 2, 19, and 30 and in Fractional Sections 20, and 31 as follows: (Refer to Sheets Nos. 73, 74, and 75 of Exhibit No. 17.)

Section 2

The following lands in Sec. 2, T 1 N, R 1 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at point on N line of highway, 850 feet E and 570 feet more or less N of SW corner of Sec. 2; thence N 36° 40′ E 1780 feet; thence S 83° 45′ E 180 feet; thence S 14° 45′ W 1390 feet more or less to point on N line of said highway; thence W 915 feet more or less along said N line of highway to place of beginning.

Section 19

The following lands in Sec. 19, T 1 N, R 1 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Section 19; thence S 5240 feet more or less along E line of said section to SE corner thereof; thence W 650 feet along S line of said section; thence N 15° 50′ W 1275 feet; thence S 62° 45′ W 825 feet; thence N 41° 00′ E 875 feet; thence N 6° 05′ E 1145 feet; thence N 25° 15′ E 2300 feet; thence N 10° 20′ W 520 feet more or less to point on N line of said section; thence E 140 feet more or less along said N line to place of beginning.

Fractional Section 20

All lands in W ½ of Frac. Sec. 20, T 1 N, R 1 E, 1st P. M.

Section 30

The following lands in Sec. 30, T 1 N, R 1 E, 1st P. M., included within the lines described as follows, to-wit:

Beginning at NE corner of Sec. 30; thence S 2550 feet more or less along E line of said section to E ¼ corner; thence W 2530 feet along S line of NE ¼; thence N 58° 30′ E 835 feet; thence N 41° 10′ E 1500 feet; thence N 12° 40′ E 1020 feet more or less to point on N line of said section; thence E 660 feet more or less along said N line to place of beginning.

Also the following lands in said section included within the lines described as follows, to-wit:

Beginning at SW cor. of Sec. 30; thence N 690 feet along W line of said section; thence N 62° 50′ E 895 feet; thence N 49° 25′ E 625 feet; thence S 82° 40′ W 510 feet; thence S 73° 00′ W 610 feet; thence N 4° 30′ E 460 feet; thence S 84° 20′ E 610 feet; thence N 70° 30′ E 850 feet; thence N 58° 45′ E 970 feet more or less to point on E line of W½ of said section; thence S 2470 feet more or less along said E line to S ¼ corner; thence W 2400 feet more or less along S line of said section to place of beginning.

Fractional Section 31

All lands in W ½ of Frac. Sec. 31, T 1 N, R 1 E, 1st P. M.

MIAMI TOWNSHIP

Such lands in F R 2, T 1, M.R's, Miami Township, are located in Fractional Sections 6, 17, and 22 as follows: (Refer to Sheets Nos. 72 and 73 of Exhibit No. 17.)

Fractional Section 6

The following lands in Frac. Sec. 6, F R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Frac. Sec. 6, 270 feet W of NE corner thereof; thence S 7° 35′ E 970 feet; thence S 20° 10′ W 985 feet; thence S 5° 20′ W 860 feet; thence S 24° 30′ E 790 feet more or less to point on E line of said fractional section; thence S 470 feet along said E line; thence N 49° 20′ W 270 feet; thence N 26° 30′ W 1355 feet; thence N 16° 00′ E 1805 feet; thence N 0° 55′ W 820 feet more or less to point on N line of said fractional section; thence E 325 feet more or less along said N line to place of beginning.

Fractional Section 17

The following lands in Frac. Sec. 17, F R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point of intersection of E line of Frac. Sec. 17 with S line of first E and W highway S of Miami River; thence S 100 feet along E line of said fractional section; thence S 85° 35′ W 1180 feet; thence N 85° 15′ W 3575 feet more or less to point on E line of N and S highway; thence N 310 feet more or less along said E line of N and S highway to point on S line of said E and W highway; thence E 4810 feet more or less along S line of said E and W highway to place of beginning.

Fractional Section 22

The following lands in Frac. Sec. 22, F R 2, T 1, M.R's, included within the lines described as follows, to-wit:

Beginning at point on E line of first highway E of Miami River, 2530 feet northerly from S line of Frac. Sec. 22, said distance being measured along said E line of highway; thence N 815 feet along said E line of highway; thence S 55° 00′ E 1070 feet; thence westerly 1270 feet more or less to place of beginning.

MIAMI TOWNSHIP

Such lands in F R 1, T 2, M.R's, Miami Township, are located in Section 36 as follows: (Refer to Sheet No. 76 of Exhibit No. 17.)

Section 36

The following lands in Sec. 36, F R 1, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 36, 4000 feet W of NE corner of said section; thence S 28° 15′ W 1065 feet; thence S 10° 30′ E 765 feet; thence N 66° 25′ W 455 feet; thence S 59° 45′ W 725 feet more or less to point on W line of said section; thence N 1660 feet more or less along said W line to point on E bank of Miami River; thence northeasterly 520 feet more or less along said E bank to point on N line of said section; thence E 830 feet more or less along said N line to place of beginning.

GREEN TOWNSHIP

Such lands in F R 2, T 2, M.R's, Green Township, are located in Section 36 as follows: (Refer to Sheet No. 71 of Exhibit No. 17.)

Section 36

The following lands in Sec. 36, F R 2, T 2, M.R's, included within the lines described as follows, to-wit:

Beginning at point on N line of Sec. 36, 1520 feet E of NW corner thereof; thence E 910 feet along said N line; thence S 45° 35′ W 520 feet; thence S 7° 15′ W 900 feet; thence S 14° 35′ E 2205 feet; thence S 10° 30′ W 615 feet; thence N 17° 05′ W 2135 feet; thence northerly 2020 feet more or less to place of beginning.

STATE OF OHIO

THE MIAMI CONSERVANCY DISTRICT

REPORT OF THE CHIEF ENGINEER

ARTHUR E. MORGAN

SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

IN THREE VOLUMES

Volume III

DAYTON, OHIO

MARCH, 1916

OFFICERS OF THE MIAMI CONSERVANCY DISTRICT

DAYTON, OHIO

BOARD OF DIRECTORS

EDWARD A. DEEDS, Dayton
Chairman

HENRY M. ALLEN, Troy

GORDON S. RENTSCHLER, Hamilton

BOARD OF APPRAISERS

J. EDWARD SAUER, Dayton
Chairman

SAMUEL M. GOODMAN, Hamilton

CHARLES W. KISER, Piqua

SECRETARY

EZRA M. KUHNS

ATTORNEY

OREN BRITT BROWN

COUNSEL

JOHN A. MCMAHON

CHIEF ENGINEER

ARTHUR E. MORGAN

REPORT OF THE CHIEF ENGINEER OF THE MIAMI CONSERVANCY DISTRICT, SUBMITTING A PLAN FOR THE PROTECTION OF THE DISTRICT FROM FLOOD DAMAGE

VOLUME I

Letter of Transmittal

Introductory

Synopsis of Plan

Part I. —Data on which Plan is based

Part II. —Development of the Plan

Part III.—Statement of the Plan

VOLUME II

Part IV.—Property Affected by the Plan

VOLUME III

Part V. —Contract and Specifications

Part VI.—Estimates of Quantities and Cost

Two volumes of Exhibits, containing 408 drawings, accompany this report, but have not been published in a form available for general distribution.

This volume contains:

A form to be used in advertising the letting of contracts;

A form of agreement to be entered into between the Contractor and the District;

A form of bond to be executed by the Contractor for the protection of the District;

Specifications outlining the manner in which the work is to be done; and

Estimates of quantities and cost.

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PART V

CONTRACT AND SPECIFICATIONS

Exhibit A

ADVERTISEMENT

FLOOD CONTROL WORKS

OFFICE OF THE BOARD OF DIRECTORS
THE MIAMI CONSERVANCY DISTRICT

Dayton, Ohio,_____191___

Sealed proposals will be received at the office of the Secretary, Board of Directors, The Miami Conservancy District, Dayton, Ohio, until_____o'clock____M _____ _____19___ for the construction of _____ _____ involving approximately the following principal quantities:_____ _____ _____ which works are a part of the system of flood control for The Miami Conservancy District, to be carried out under authority of the Conservancy Act of Ohio, and are in accordance with the Official Plan of the District.

Proposals must be on the blank forms furnished by the Board, and must be accompanied by a certified check for not less than 5 per cent of the aggregate amount of the bid, figured on the basis of the estimated quantities and the unit prices bid, but which in no case need exceed $50,000; such check to be drawn to the order of the Treasurer of The Miami Conservancy District, as a guarantee that

the bidder, if awarded a contract, will, within_____days after the contract is delivered to him for that purpose, execute the same, and furnish surety bond for the faithful performance of the contract, in the sum of 40 per cent of the contract price; said contract and bond to be on the standard forms which have been adopted by the Board.

If any bidder, to whom an award has been made, shall fail to execute the contract or to furnish satisfactory bond within the time hereinbefore specified, or as extended by the Board, the award shall thereupon become void, in which case the proceeds of the certified check shall become the property of the District, and the contract may be awarded to the next lowest or best bidder; and such next lowest or best bidder shall thereupon assume the contract, as if he were the party to whom the award was first made.

Each bidder must, in his proposal, present satisfactory evidence that he has been engaged in constructing works of the general character covered by his proposal, and that he is fully prepared, and has the necessary capital, to begin the work promptly, and to conduct it as required by the contract and specifications. Proposals not containing such evidence will not be recognized as bids.

The right is reserved to reject any or all bids, and to waive any technical defects, as the interests of the District may require.

Drawings, specifications, proposal blanks, and other information may be obtained on application to the Chief Engineer, The Miami Conservancy District, Dayton, Ohio, at whose office drawings, boring samples, and other data may be inspected.

Secretary.

Exhibit B

AGREEMENT

THIS AGREEMENT, made and entered into this_____ day of_____, in the year One Thousand Nine Hundred and _____ by and between The Miami Conservancy District, a corporation organized and existing under the Conservancy Act of Ohio, passed February 6, 1914, acting through its Board of Directors, by virtue of the power vested in it by said Act, party of the first part, and_____

_____

_____

of the City of_____County of_____, and State of_____, hereinafter designated as the **Contractor**, party of the second part,

WITNESSETH: That the parties to these presents each in consideration of the undertakings, promises, and agreements on the part of the other herein contained, have undertaken, promised, and agreed, and do hereby undertake, promise, and agree, the party of the first part for itself, its successors, and assigns, and the part____ of the second part for_____and_____heirs, executors, administrators, and assigns, as follows:

Article 1.—In consideration of the payments to be made as hereinafter provided, and of the performance by the party of the first part of all of the matters and things by it to be performed as herein provided, the Contractor, party of the second part, agrees, at his own sole cost and expense, to perform all the labor and services, and furnish all the materials, plant, and equipment necessary to complete, and to complete in good, substantial, workmanlike, and approved manner, within the time hereinafter specified, and in accordance with the terms, conditions and provisions of this Contract and of the instructions, orders and directions of the Engineer made in accordance with this Contract, the following work to-wit:_____

Article 2.—The Contractor further agrees to begin work within _____ days from the date of execution hereof, and to prosecute the same with speed and diligence so as to insure the completion of the work on or before_____

_____.

It is hereby agreed that the period from_____, hereafter called **Time of Beginning,** to_____ _____, hereafter called the **End of Period of Preparation,** shall be utilized by the Contractor in assembling plant and equipment, organizing forces, and in getting the work under way so that thereafter he may maintain the rate of progress prescribed, and complete the work within the time specified in this Contract.

The maintenance of the required rate of progress on this Contract, and its completion within the specified time, being to an exceptional degree necessary for the complete success of the work, on account of the urgent need for relief and the very serious disadvantage of a delayed construction period, the Contractor agrees to take all precautions in preparation and management which may be necessary to insure the rate of progress and the time of completion required by this Contract.

Article 3.—The Miami Conservancy District, party of the first part, agrees to pay, and the Contractor, party of the second part, agrees to accept, as full compensation, satisfaction and discharge, for all work done and all materials furnished, whether mentioned in the following schedule or not, and for all costs and expenses incurred and damages sustained, and for each and every matter, thing or act performed, furnished or suffered, in the full and complete performance and completion of the work of this Contract in accordance with the terms, conditions, and provisions thereof and of the instructions, orders and directions of the Engineer thereunder, except **Extra Work** which shall be paid for as provided in Section 0.19 of the Specifications, and except as in this Contract otherwise specifically provided, a sum equal to the amount of the actual work done and materials furnished, as determined by the Engineer, under each Item in the following Schedule multiplied by the Unit Price applicable to each such Item, as set forth in the following Schedule, to-wit:

Schedule of Unit Prices and Estimated Quantities.

Item	Classification	Estimated Quantity	Unit of Quantity	Unit Price

Article 4.—In case of default in completing the whole work to be done under this Contract within the time herein specified, including such extensions as may have been granted, the Contractor hereby agrees to pay to the party of the first part as liquidated damages for such default; First, a sum sufficient to compensate said first party for the cost and expense of employing engineers, inspectors, and employees to the extent that their services are reasonably required during the period of default by the work of this Contract; and Second, a sum equal to one-half of one per cent on all moneys that have been paid the Contractor under this Contract for each calendar month or part thereof that the completion of the whole work under this Contract is delayed. The party of the first part shall have the right to deduct such liquidated damages from any moneys due or to become due the Contractor, and the amount, if any, still owing after such deduction shall be paid on demand by the Contractor or his Surety. Payment of such liquidated damages shall not relieve the Contractor or his Sureties from any other obligation under this Contract.

Article 5.—If the Contractor shall fail to comply with any of the terms, conditions, provisions, or stipulations of this Contract according to the true intent and meaning thereof, then the party of the first part may avail itself of any or all remedies provided in that behalf in the Contract, and shall have the right and power to proceed in accordance with the provisions thereof.

Article 6.—It is hereby agreed by the parties to this Agreement that the following exhibits attached thereto and made parts thereof shall constitute integral parts of said Agreement, the whole to be collectively known and referred to as the **Contract:**

Advertisement	Exhibit A
Agreement	Exhibit B
Bond	Exhibit C
Specifications	Exhibit D

which specifications include:

(a) General Conditions
(b) General Specifications
(c) Detail Specifications

Contract Drawings Exhibit E

(to be listed by number and title)

Article 7.—The Contractor agrees to furnish a bond or bonds in such form and in such amount and with such Sureties, as is hereinafter provided, and as will be satisfactory to the Board, conditioned upon the faithful and complete performance and carrying out of this Contract.

IN WITNESS WHEREOF: The Miami Conservancy District, party of the first part, its Board of Directors having duly approved this Contract by resolution passed on the_____day of_____, 191___, has hereunto affixed its corporate name and the name of the President of its Board of Directors, and has hereto attached its corporate seal attested by the Secretary of its Board of Directors; and_____

_____

_____, party of the second part, has hereunto affixed his their name___ and seal___ its corporate name by its President thereunto duly authorized, and has hereto attached its corporate seal attested by its Secretary, **in duplicate,** the day and year first above written.

[SEAL] **THE MIAMI CONSERVANCY DISTRICT**

_____

President, Board of Directors.

PARTY OF THE FIRST PART

Attest:

_____

Secretary, Board of Directors.

_____

By_____

President.

_____[SEAL]

_____[SEAL]

[SEAL] _____[SEAL]

Attest: PARTY OF THE SECOND PART

_____

Secretary.

_____

_____

Witnesses.

Exhibit C

BOND

KNOW ALL MEN BY THESE PRESENTS, That we_____

_____

_____

of_____, County of_____ and State

of_____, as **Principal,** hereinafter called the **Contractor,**

and _____ _____

_____

organized under the laws of the State of_____ and duly authorized to transact business within the State of Ohio, as **Surety,** hereinafter called the **Surety,** are held and firmly bound unto THE MIAMI CONSERVANCY DISTRICT, a corporation organized under the laws of the State of Ohio, with its principal place of business located at Dayton, County of Montgomery, and State of Ohio, as **Obligee,** hereinafter called the **District,** in the sum of_____

_____

dollars ($_____) lawful money of the United States, for the payment whereof to the District the Contractor binds_____

_____, _____ heirs, executors, administrators, successors, and assigns, and the Surety binds itself, its successors, and assigns, firmly by these presents.

WHEREAS the Contractor and the District have entered into a written contract, dated the_____ day of_____

_____191___, hereinafter called the **Contract,** a copy of which is attached hereto and made a part hereof, for_____

_____

_____

THE CONDITION OF THIS OBLIGATION IS SUCH that if the said Contractor shall pay all persons, firms or corporations who perform labor or furnish equipment, supplies and materials for use in the work thereunder, and shall satisfy all claims against the District, for damages to life, limb or property that may be caused by the acts of, or negligence of, the Contractor or any of his agents or employees, and shall satisfy all suits or claims brought against the District arising from the violation of any law, ordinance, regulation, order or decree on the part of the Contractor or any of his agents or employees; or from any infringement, or alleged infringement of patents in the work under said Contract; or howsoever originating from any of the operations under said Contract; and shall fully indemnify and save harmless the District from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the District all outlay and expense which the District may incur in making good any such default, and in all other particulars shall faithfully perform the Contract on his part according to all the terms, covenants, and conditions thereof and within the time specified therein, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED,

First—That should the Contractor fail to comply with the provisions of the Contract to such an extent that the Contract shall be forfeited, the Surety shall have the right to assume the Contract and proceed to perform or sublet the same, as therein provided. And the Surety shall, in that event, be subrogated to all the rights and interests of the Contractor arising out of the Contract, and be entitled to hold and use all of the equipment and properties of the Contractor which may be necessary for the completion of the Contract; and all moneys which may be due the Contractor at the time of his default or which may thereafter become due said Contractor, under or by virtue of the Contract, shall become due and payable to the Surety as the work progresses, subject to all of the terms of the Contract.

Second—That any alterations which may be made in the terms of the Contract, or in the work or materials to be furnished thereunder; or the granting by the District of any extension of time; or any forbearance or action on the part of either the District or the Contractor toward the other under said Contract; shall not in any way release the Contractor and the Surety, or either of them, their

heirs, executors, administrators, successors, or assigns, from their liability hereunder; notice to the Surety of any such alteration, extension, forbearance, or action, being hereby waived; provided that the written consent of the Surety shall first be obtained if any alteration be required which shall alter the general character of the work as a whole, or which shall increase the total amount to be paid to the Contractor by more than 25 per cent.

Third—No right of action shall accrue hereunder to or for the use or benefit of any one other than the District, and the District's rights hereunder may not be assigned without the written consent of the Surety.

Signed and sealed, this_____ day of

_____ 19___.

Witnesses:

_____ _____[SEAL]

_____ _____[SEAL]

_____ _____[SEAL]

PRINCIPAL.

[Seal]

_____

_____

_____

President.

SURETY.

Attest:

_____

Secretary.

Exhibit D

SPECIFICATIONS

EXPLANATORY NOTE

The specifications fall into three parts; first, the General Conditions, Sections 0.1 to 0.57, governing the relations of the contractor to the District, to the public, and to his employees; second, the General Specifications, Sections 0.58 to 0.105, defining and classifying the most commonly used materials, and indicating in general how the work shall be done; and third, the Detail Specifications, Sections 1.1 to 90.2. The Detail Specifications by supplementing the Agreement, General Conditions, General Specifications, the Estimates, and the Drawings, define in detail how each kind of work shall be done, and how it will be measured for payment.

The different kinds of construction work to be done and of materials to be furnished are classified into **items**, an item meaning a certain kind of work to be done, or material to be furnished, in a certain definite manner, regardless of its location. Each item is designated by a name and number, the numbers running from 1 to 90; as Item 2, Clearing and Grubbing; or Item 51, Reinforcing Steel. All **sections** relating to any item bear the number of the item as an index number before the decimal point. For instance, Item 52 covers vitrified brick conduit lining. Section 52.1 specifies the kind of brick required, Section 52.2 specifies the quality of the brick, Section 52.3 specifies a method for testing vitrified brick, etc., and Section 52.7 describes the method of measuring the vitrified brick conduit lining for payment.

All item numbers with letter "a" affixed refer to work below mean low water level as indicated on the drawings. For instance, Items 41 and 41a include concrete in outlet works, spillways, retaining walls, bridge piers, and other similar structures, above and below mean low water, respectively. The same item may be met on various parts of the project. Wherever in the estimates or on the drawings "Item 41" is indicated, regardless of whether it occurs in

channel improvement at Hamilton, or in the construction of the Englewood Dam, or in some other construction, the work to be done is the placing of concrete in accordance with the Specifications under Item 41, supplemented in all cases by the General Specifications, which apply to all items. Item 41a refers to the same kind of construction as Item 41, except that the work is located below mean low water, as shown on the drawings.

In brief, the General Conditions and General Specifications relate, in so far as they are applicable, to all work. The estimates and the drawings indicate under what item or items any particular part of the work is to be done, and the Specifications for that item give the necessary further directions for doing that particular work.

The estimates are classified by items, but are also grouped in the divisions into which the work naturally falls. Thus, the estimates for each dam are grouped separately, the work in each case being classified according to items. In the same manner, the estimates for each local flood control improvement are listed separately. Within these natural groups, the individual features are also grouped together in the estimates. Thus, in the estimates for local flood control work at Hamilton, the required amount of work and material is listed by items separately for flood gates, levees, sewers, or other constructions, and in addition, a summary by items is given for the entire improvement at Hamilton.

While the specifications for doing the work are uniform for any item, wherever it may occur, the unit price will not necessarily be the same. For instance, Clearing and Grubbing under Item 2 might cost more at the Germantown damsite than at the Huffman damsite, though the specifications are identical, because of the heavier timber at one place than at the other. The Contractor will bid by reference to items, but the entire work will be divided into contracts of such size and nature that the same unit price can reasonably apply to all work under any one item in a single contract. For instance, if the construction of the Germantown Dam were to be let as one contract, the contractor would bid only one unit price for Clearing and Grubbing the damsite, in his bid on that particular contract.

GENERAL CONDITIONS

0.1 Definitions.—Wherever the words herein defined, or pronouns used in their stead, occur in this Contract and Specifications, they shall have the meanings here given:

The word **District** or the expressions **Party of the First Part** or **First Party** shall mean the Corporation of The Miami Conservancy District.

The word **Board** shall mean the Board of Directors of The Miami Conservancy District, or any agency or officer duly authorized to act for the District in the execution of the work required by this Contract.

The word **Directors** shall mean the individual members of the Board of Directors acting in their official capacity.

The word **Engineer** shall mean the Chief Engineer of The Miami Conservancy District, or his properly authorized agents, engineers, assistants, inspectors, and superintendents, acting severally within the scope of the particular duties entrusted to them.

The word **Contractor** or the expressions **Party of the Second Part** or **Second Party** shall mean the person, persons, partnership, or corporation entering into this Contract for the performance of the work required by it, and the legal representatives of said party, or the agent appointed to act for said party in the performance of the work.

The words **Surety** or **Sureties** shall mean the bondsmen or party or parties who have made secure the fulfillment of the Contract by a Bond, and whose signatures are attached to said Bond.

The word **Contract** shall mean, collectively, all of the covenants, terms, and stipulations contained in the various portions of this Contract, to-wit:

Advertisement, Agreement, Bond, Specifications, and Contract Drawings.

The word **Specifications** shall mean, collectively, all of the terms and stipulations contained in those portions of the Contract known as the General Conditions, General Specifications, and Detail Specifications.

The word **Drawings** shall mean, collectively, all of the drawings attached to the Contract and made part thereof, and also such supplementary drawings as the Engineer may issue from time to

time in order to elucidate said contract drawings or for showing details which are not shown thereon, or for the purpose of showing changes in the work as authorized under Section 0.18 of the Specifications entitled **Changes and Alterations.**

The words **Contract Price** shall mean either the unit price or unit prices named in the Agreement, or the total of all payments under the Contract at the unit price or unit prices, as the case may be.

Wherever in this Contract or in the Official Plan the words **Directed, Required, Permitted, Ordered, Instructed, Designated, Considered Necessary, Prescribed,** or words of like import are used, it shall be understood that the direction, requirement, permission, order, instruction, designation, or prescription, etc., of the Engineer is intended; and similarly, the words **Approved, Acceptable, Satisfactory,** or words of like import, shall mean approved by, or acceptable or satisfactory to, the Engineer, unless another meaning is plainly intended.

Wherever figures are given in this Contract after the word **Elevation** or an abbreviation of it, or where figures representing elevations are given, they shall mean distance in feet above the United States Geological Survey Sea Level Datum, as determined from various bench marks placed by said Survey in and adjoining the lands of The Miami Conservancy District.

0.2 Sureties.—With the execution and delivery of this Contract the Contractor shall give security for the faithful performance of the Contract by filing with the Board one or more Surety bonds in the form annexed hereto, the aggregate amount of which shall be not less than 40 per cent of the estimated total contract price. Each bond must be signed by the Contractor and the Sureties. The Sureties, and the amount in which each will qualify, must be satisfactory to the Board.

Should any Surety upon the Contract be deemed unsatisfactory at any time by the Board, notice will be given the Contractor to that effect, and the Contractor shall forthwith substitute a new Surety or Sureties satisfactory to the Board. And no further payment shall be deemed due or shall be made under this Contract, until the new Surety or Sureties shall qualify and be accepted by the Board.

At the expiration of each year after the date of Contract, the liability of the Sureties under the bonds may be reduced to the extent to which, in the opinion of the Board, the need for Surety is

reduced, until such liability shall amount to 25 per cent of the original liability, at which amount the bonds shall remain in full force and virtue until the completion of the entire work.

0.3 Time and Order of Completion.—The Contractor agrees that the work shall be commenced and carried on at such points, and in such order of precedence, and at such times and seasons as may be directed by the Engineer. The Engineer shall have the right to have the work discontinued, for such time as may be necessary, in whole or in part, should the condition of weather, or of flood, or other contingency make it desirable so to do, in order that the work shall be well and properly executed. Extension of time may be granted the Contractor for discontinuance of work so required, as provided in section 0.4 of the Specifications, entitled **Extension of Time.**

The Contractor further agrees that he will begin work not later than at the time specified in the Agreement, and will progress therewith at such a rate that the work shall be completed in accordance with the Contract. It is further agreed that the rate of progress shall be at least such that the work accomplished up to the end of each six months period,—the first period, commencing at the end of the period of preparation as specified in the Agreement,—shall have the same proportion to the whole work, as the time consumed since the end of the period of preparation has to the entire time allowed for completing the Contract after the period of preparation.

For the application of this rule, the period from December 1 to March 31 inclusive, shall be considered as equal to 2 months, and the period from April 1 to November 30, inclusive, shall be considered as equal to 10 months. Determination as to whether this rate of progress is being maintained shall be made by comparing the value, at the contract price, of the work done as shown in the progress estimates, with the total estimated contract price. Any failure to maintain the required rate of progress, after taking into consideration extensions of time that have been granted, shall be a breach of contract, just as would be a failure to complete the entire work within the specified time.

The Board shall have the right, at its discretion, to extend the time for the completion of the work beyond the time stated in this Contract, for reasons set forth in Section 0.4, entitled **Extension of Time;** but such extension, if so granted, shall waive no other obligations of the Contractor or of the Sureties, and if the time for the completion of the work be extended by the Board, then in such case, the District shall be fully authorized and empowered to make

such deductions from the final estimate of the amount due the Contractor, as are stipulated in Article 4 of the Agreement, for each calendar day that the Contractor shall be in default for the completion of the work beyond the date to which the time of completion shall have been extended by the Board. Should the Contractor be permitted to continue and finish the work or any part thereof after the time fixed by the Contract for completion, or as it may have been extended, such permit shall in no wise operate as a waiver on the part of the District, of its right to collect the liquidated damages agreed upon in case of such delay, or of any of its rights under this Contract.

0.4 **Extension of Time.**—Delays due to causes beyond the control of the Contractor other than such as reasonably would be expected to occur in connection with or during the performance of the work, may entitle the Contractor to an extension of time for completing the work sufficient to compensate for such delay. No extension of time shall be granted, however, unless the Contractor shall immediately, but in any case within 15 days from the initiation of the delay, notify the Engineer in writing of such delay, and of the time of beginning and the cause of the same, and unless he shall within 15 days after the expiration of such delay notify the Engineer in writing of the extension of time claimed on account thereof,—and then only to the extent, if any, allowed by the Engineer. No extension of time shall operate to release the Surty from any of its obligations.

The Contractor declares that he has familiarized himself with weather, river, and local conditions and other circumstances which may, or are likely to, affect the performance and completion of the work, and that he has carefully examined the data and information pertinent thereto collected by the Engineer and on file in his office, and agrees that, taking these conditions and circumstances into account, he will provide adequate equipment and prosecute the work in such manner, and with such diligence, that the same will be completed within the time specified herein, or as the same may be extended, even though the most adverse conditions which reasonably could be expected to occur during the period of construction do prevail during the performance of the work. It is understood, however, that as to river and weather conditions the Contractor shall provide against the most adverse conditions and circumstances which reasonably are to be expected to occur on the average within a 15-year period, as shown by past records.

When the work of the District is enjoined by legal proceedings which prevent the Contractor from prosecuting any of the work of this Contract, an extension of time may be granted sufficient, in the opinion of the Engineer, to compensate for such delay. But no injunction as to a part of the Contractor's work shall entitle him to an extension of time, unless, in the opinion of the Engineer, such injunction unavoidably delays the completion of the whole work.

0.5 District to Furnish Right-of-Way.—The Board will furnish to the Contractor all right-of-way, which in the opinion of the Engineer, is necessary for carrying on the work, for taking or wasting material, for camp sites, and for securing access to the site of the work. In case of serious interference to the work by delay in furnishing such right-of-way, the Contractor shall be allowed an extension of time equivalent to the time lost by unavoidable delay in the completion of the Contract because of the failure to furnish the right-of-way on time.

In case of serious delay and loss to the Contractor because of failure of the District to furnish right-of-way which in the opinion of the Engineer is necessary for the work, the Contractor shall be compensated for such loss.

0.6 Inspection and Right of Access.—The Board contemplates, and the Contractor hereby agrees to, a thorough and minute inspection by the Engineer, or by any of his agents or by any agents which the Board may appoint for such purpose, of all work and material furnished under this Contract, in order to ascertain whether all workmanship or materials are in strict accordance with the requirements of this Contract. The Contractor is entitled to such inspection upon application to the Board or to the Engineer, provided, that when the Contractor requests the inspection of materials not yet delivered to the site of the work, he shall pay the reasonable traveling expenses of the Engineer or agent in making such inspection, and he shall not require the continued presence of the Engineer or agent at the place of manufacture or shipment, for the purpose of making intermittent or occasional inspections.

The Contractor shall furnish to the Board, the Engineer, or any of their agents, access at all times to the work and to the premises used by the Contractor, and shall provide them every reasonable facility, including ladders, steps, scaffolds or platforms, as may be desirable, for the purpose of inspection, even to the extent of discontinuing portions of the work temporarily, or of uncovering or taking down portions of finished work. In case of taking down or uncovering work, should the work thus exposed or examined prove

satisfactory, the uncovering or taking down, and replacing or making good, of the parts disturbed, shall be paid for as Extra Work as provided in Section 0.19 of the Specifications, entitled **Extra Work**; but should the work examined prove unsatisfactory, the uncovering, taking down, replacing and making good shall be at the expense of the Contractor. The Contractor shall make no charge for temporary discontinuance of work for purposes of inspection.

The Contractor agrees to make suitable provision for the unrestricted inspection by any authorized engineer or agent at places of manufacture, of any materials being made or prepared for use under this Contract.

The Contractor shall regard and obey the directions and instructions of any authorized engineer or agent with reference to correcting any defective work or replacing any materials found to be not in accordance with the Specifications and Drawings, and in case of dispute the Contractor may appeal to the Chief Engineer, whose decision shall be final; but pending such decision the instructions of said engineer or agent shall be followed, and the Contractor shall make no claim for damages or delay on this account, except as provided in Section 0.39, of the Specifications, entitled **Hindrances and Delays.**

The Contractor shall, whenever so requested, give the Engineer access to the proper invoices, bills of lading, and other records, and shall, without charge therefor, provide scales with a capacity of not less than 300 pounds, and assistance for weighing or measuring any of the materials.

0.7 To Remedy Defective Work.—If the work, or any portion thereof, shall be damaged in any way, or if defects not readily detected by inspection shall develop before the final completion and acceptance of the whole work, the Contractor shall forthwith make good without compensation such damage or defect, in a manner satisfactory to the Engineer. Any materials brought upon the ground for use in the work, which shall be condemned by the Engineer as unsuitable, or not in conformity with the Contract, shall be immediately discarded and removed by the Contractor to a satisfactory distance from the work.

If the Contractor shall fail to replace any defective or damaged work or material after reasonable notice, the Engineer may cause such work or materials to be replaced, and the expense thereof shall be deducted from the amount to be paid to the Contractor.

0.8 Retaining Imperfect Work.—If the Contractor shall execute any part of the work defectively, and if the imperfection, in

the opinion of the Engineer shall not be of such magnitude or importance as to necessitate, or be of such nature as to make impracticable or dangerous or undesirable, the removal and reconstruction of the imperfect part, then the Engineer shall, with the written approval of the Board, have the right to make such deduction as may be just and reasonable, from the amounts due or to become due the Contractor, instead of requiring the imperfect part to be removed and reconstructed.

0.9 Engineer Cannot Waive Obligations.—It is expressly agreed that neither the Engineer, nor any of his assistants or agents shall have any power to waive the obligations of this Contract for the furnishing by the Contractor of good and suitable material and for his performing good work as herein described. Failure or omission on the part of the Engineer, or any of his assistants or agents, to condemn defective or inferior work or material, shall not imply acceptance of the work, or release of the Contractor from obligation to at once tear out, remove and properly replace the same without compensation, and at his own cost and expense, at any time upon the discovery of said defective work and material, prior to the final acceptance of the entire Contract and the release of the Contractor by the Board, notwithstanding that such work or such material may have been estimated for payment, or payments may have been made on the same. Neither shall such failure or omission, nor any acceptance by the Engineer or by the Board, be construed as barring the Board, at any subsequent time, from recovery of damages, and of such a sum of money as may be needed to remove and to build anew all portions of the work in which fraud was practiced or improper work or material hidden.

0.10 To Direct Work.—It is mutually agreed that the Engineer shall have the right to direct the manner in which all work under this Contract is to be conducted, in so far as may be necessary to secure the safe and proper progress and quality of the work.

Upon all questions concerning the execution of the work, and the interpretation of the Drawings and Specifications, and on the determination of quantities and cost, the decision of the Chief Engineer shall be final and binding on both parties, and his estimates and decisions shall be a condition precedent to the right of the Contractor to receive any money under this Contract.

Whenever, in his opinion it is necessary to do so, in order to insure the safe and proper completion of the Contract, he shall determine the order of precedence, and the time and seasons at which

any portion or portions of the work shall be commenced and carried on.

He shall especially direct the manner of conducting the work when it is in locations where the party of the first part is doing other work either by contract, or by its own force, or where it is necessary to have constructed or reconstructed railroads, traction lines, telephone or telegraph lines, highways or other works affected by the improvement, in order that conflict may be avoided and the work on this Contract be harmonized with that on other contracts or with other work being done in connection with, or growing out of, any operations of the District.

0.11 To Provide for Emergencies.—It is understood by all parties to this Contract that unusual conditions may arise on the work which will require that immediate and unusual provisions be made to protect the public from danger of loss or damage due directly or indirectly to the prosecution of the work, and that it is part of the service required of the Contractor to make such provisions.

The Contractor shall use such foresight and shall take such steps and precautions as may be necessary, to protect the public from danger of damage or loss of life or property, which would result from the interruption of public water supply or other public service, or from the failure of partly completed work.

Whenever, in the opinion of the Engineer, an emergency exists, against which the Contractor has not taken sufficient precaution for the safety of the public or the protection of the works to be constructed under this Contract, or of adjacent structures or property which may be injured by processes of construction on account of such neglect; and whenever, in the opinion of said Engineer, immediate action shall be considered necessary in order to protect public or private, personal or property interests liable to loss or damage on account of the operations under this Contract, then, and in that event, the Engineer, upon giving notice to the Contractor, may provide suitable protection to said interests by causing such work to be done and material to be furnished as, in the opinion of the Engineer, may seem reasonable and necessary.

The cost and expense of said work and material shall be borne by the Contractor, and if he shall not pay said cost and expense upon presentation of the bills therefor duly certified by the Engineer, then said cost and expense shall be deducted from any amounts due or which may become due said Contractor. In case the Board shall decide that all or part of the expense incurred in meeting any

emergency is such as for any reason cannot be justly charged to the Contractor, it may compensate the Contractor for all or part of the work done and material furnished in meeting such emergency.

0.12 **To Modify Methods and Equipment.**—Except where otherwise directly specified in the Contract, the Contractor shall design, lay out, and be responsible for the methods and equipment used in fulfilling the Contract; but such methods and equipment, when required, shall have the approval of the Engineer. Whenever required, the Contractor shall furnish to the Engineer for his information, bills of materials, descriptions and copies of drawings showing in reasonable detail the materials and construction of any construction plants, false work, structures, parts of any structures, or appliances, to be furnished or built under this Contract, for which complete detail drawings are not to be issued by the Engineer. If at any time the Contractor's methods or equipment appear to the Engineer to be unsafe, inefficient, or inadequate for securing the safety of the workmen, the quality of work, or the rate of progress required, he may order the Contractor to increase their safety and efficiency, or to improve their character, and the Contractor shall comply with such orders. If at any time the Contractor's working force, in the opinion of the Engineer, shall be inadequate for securing the necessary progress, as herein stipulated, the Contractor shall, if so directed, increase the force or equipment to such an extent as to give reasonable assurance of compliance with the schedule of progress; but the failure of the Engineer to make such demand shall not relieve the Contractor of his obligation to secure the quality, the safe conducting of the work, and the rate of progress required by the Contract; and the Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods.

0.13 **To Furnish Lines and Grades.**—All lines and grades will be given by the Engineer, but the Contractor shall provide such materials as are not normally part of an engineering equipment, and give such assistance as reasonably may be required by the Engineer to enable measurements and inspections to be made. He shall not be required, except for brief intervals, to furnish men or material to do the work which would naturally belong to members of a surveying or inspection party. It is the intention not to delay the work for the giving of lines or grades, but if necessary, working operations shall be suspended for such reasonable time as the Engineer may require for this purpose. No special compensation shall be made for the cost to the Contractor, of any of the work or delay

occasioned by giving lines and grades, by making other necessary measurements, or by inspection; but such costs, it is agreed, shall be included in the Unit Prices stipulated for the appropriate items of construction. The Contractor shall keep the Engineer informed, a reasonable time in advance, of the times and places at which he intends to do work, in order that lines and grades may be furnished and necessary measurements for record and payment may be made with the minimum of inconvenience to the Engineer or of delay to the Contractor.

All marks and stakes must be carefully preserved by the Contractor, and in case of their destruction by him, or any of his employees, such stakes will be replaced by the Engineer at the Contractor's expense.

0.14 To Determine Quantities and Measurements.—The Engineer shall make all measurements, and determine all quantities and amounts of work and materials done or furnished under this Contract.

Unless specifically so stated in detail in the Contract or Specifications, no extra measurements, or measurements according to local custom of any kind, shall be allowed in measuring the work under this Contract; but only the length, area, solid contents, number, weight, or time, in standard units, as the case may be, shall be considered.

It is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of areas.

0.15 To Define Terms and Explain Plans.—The various parts of the Contract are intended to be explanatory of each other, but should any discrepancy appear, or any misunderstanding arise, as to the import of anything contained in either, the explanation of the Chief Engineer shall be final and binding. Correction of any error or omission in the Drawings and Specifications may be made by the Engineer, when such correction is necessary to bring out clearly the intention which is indicated by a reasonable interpretation of the Drawings and Specifications as a whole.

Whenever, in the Specifications, or in Drawings which are a part of this Contract or which may be furnished to the Contractor for directing his work, the terms or descriptions of various qualities of workmanship, material, structures, processes, plant, or other features of the Contract, are described in general terms, the meaning and fulfillment of which must depend upon individual judgment; then, in all such cases, the question of the fulfillment of such

Specifications or requirements shall be decided by the Chief Engineer, and said material shall be furnished, said work shall be done, and said structure, process, plant, or feature shall be constructed, furnished or carried on in full and complete accordance with his interpretation of the same, and to his full satisfaction and approval.

0.16 Completeness of Specifications, Estimates, and Drawings. —The Specifications and Drawings, taken in connection with the estimates and other provisions of this Contract, are intended to describe and show the work required to be done, and the material required to be furnished. The quantities of the various classes of work to be done and materials to be furnished under this Contract, are presented for the purpose of comparing on a uniform basis the proposals offered for the work under this Contract. It is recognized to be impracticable to determine beforehand with accuracy the quantity entering into the construction.

The Specifications and Drawings are to be taken, therefore, as indicating the approximate amount of work, its approximate nature and position, and the method of construction, insofar as the same are determined in advance, and neither the Board nor any agent or officer thereof, guarantees that the actual amount of work will correspond with the quantities estimated by the Engineer; and the Contractor hereby agrees that he will make no claim for anticipated profits, or for losses, because of any difference between the quantities of the various classes of work actually done, or materials actually furnished, and the estimated quantities stated in the Agreement. The work is intended to be constructed in accordance with the best practice and with due regard for the safety of the structures; and in the event of any doubt as to the meaning of any portion of the Contract, Specifications, Drawings, Supplementary Drawings, or instructions of the Engineer, the same shall be understood to call for the best types of construction, both as to materials and workmanship, which reasonably can be interpreted.

Wherever, in the Specifications or in the Drawings, standard specifications or other publications are referred to, copies thereof may be found, available for reference, at the office of the Chief Engineer.

Any work or material not herein specified or shown on the Drawings, but which by fair implication would be included in any items in the Contract, shall be done or furnished by the Contractor without additional charge therefor.

0.17 Items of Work.—The division into Items has been made to enable the Contractor to bid on the different portions of the work in accordance with his estimate of their unit cost, so that in the event of any increase or decrease in the quantities of any particular kind of work, the actual quantities executed may be paid for at the Unit Price for that particular kind of work.

0.18 Changes and Alterations.—The Board reserves the right to make such alterations, eliminations, and additions as it may elect in the line, grade, form, location, dimensions, plan or material of the work herein contemplated, or any part thereof, either before or after the commencement of construction.

If such changes diminish the quantity of work to be done, they shall not constitute a claim for damages or anticipated profits on the work that may be dispensed with; provided, that if said first party shall make such changes or alterations as shall make useless any work already done or material already furnished or used in said work, the Engineer shall make reasonable allowance therefor, which action shall be binding on both parties. If they increase the amount of work, such increase shall be paid for according to the quantities actually done, and at the Unit Prices established for such work under this Contract. Extra work shall be paid for as hereinafter provided.

0.19 Extra Work.—If, during the performance of this Contract, it shall become necessary or desirable for the proper completion of the work hereunder to order additional work done or materials furnished, whether mentioned herein or indicated on the Drawings or not, which in the opinion of the Engineer are not susceptible of classification under the Schedule of Unit Prices, the Contractor shall, if ordered in writing by the Engineer, do and perform such work and furnish such materials; and he shall be paid therefor the actual and necessary net cost, as determined by the Engineer, plus 15 per cent thereof. Such actual net cost shall cover all labor and materials necessary for the performance of the extra work, including any extraordinary expenses incurred directly on account thereof, the wages of foremen, and the expense attached to Contractor's liability insurance covering the labor so employed; but in making payment to the Contractor for such extra work, no allowance shall be made for overhead charges, general superintendence, general expenses, contingencies, or use and depreciation of, and wear and tear upon plant. Charge for extra work shall not include the maintenance of the Contractor's camp, except in case such camp be maintained primarily to carry on extra work.

The Contractor shall have no further claim in excess of the foregoing, and this method of payment shall not apply to the performance of any work or the furnishing of any material which in part or in whole is, in the opinion of the Engineer, susceptible of classification under the Schedule of Unit Prices. In case any work or material shall be required to be done or furnished under the provisions of this section, the Contractor shall at the end of each day during the progress thereof furnish to the Engineer daily time slips showing the name or number of each workman employed thereon, with the time worked, the character of work he is doing and the wages paid or to be paid to him, and also a daily memorandum of the material used on such extra work, showing the amount and character of such material, from whom purchased, and the amount paid or to be paid therefor. If required by the Engineer, the Contractor shall produce any books, vouchers, records, and memoranda showing the work and materials actually paid for and the actual prices therefor. Such daily time slips and memoranda shall not be binding upon the District, except in so far as they are reasonable, accurate, and pertinent, and if any question or dispute should arise as to the correct cost of such extra work or material, the determination of the Engineer upon such question shall be final and conclusive.

It is further agreed that if at any time the number of men employed by the Contractor on work done under this section of the Contract, or the character of such men or the plant and equipment so employed, are not, in the opinion of the Engineer, the best adapted for the satisfactory prosecution of the work, the Engineer shall so notify the Contractor in writing, whereupon the latter shall increase or decrease the number of men, or substitute different men, or make such changes in plant and equipment, as shall be ordered by the Engineer. Extra work so ordered shall constitute a part of the work to be done under this Contract, and all and singular the provisions and conditions of this Contract and of the Bond accompanying it shall apply to the said extra work as if the same were specified in the Contract.

As a condition precedent to the right to receive any money for extra work and material furnished under this Contract, the Contractor shall deliver to the Board, before the 15th day of the month following a month in which any such extra work has been done or extra material furnished, an itemized bill of the cost of such materials or work, and unless it is so filed the claim for an extra shall be deemed waived.

0.20 Progress Estimates.—In order to assist the Contractor to prosecute the work advantageously, the Engineer shall, from time to time, during the active progress of the work, approximately once a month, make a determination of all work done and materials incorporated in the work by the Contractor up to that time, and a progress estimate, in writing, showing: the value of such work and materials under and according to the terms of this Contract; any other amounts due the Contractor; all deductions made in accordance with the provisions of the Contract; then, from the balance, a deduction of 10 per cent of such balance, or a larger percentage, if in the opinion of the Engineer the protection of the District so requires; then, from the remainder, a deduction of the total amount of all previous payments; and finally, the amount due the Contractor under such progress estimate. Such progress estimates shall not be required to be made by strict measurements, but they may be made either by measurement or by approximation. Progress estimates may, at any time, be omitted if, in the opinion of the Engineer, the protection of the District so requires.

Estimates of value of not to exceed 90 per cent of their cost will be included in the body of the estimate for material intended for use in the work, delivered at the site of the work, provided that if such material shall greatly exceed the amount required for the succeeding month's consumption or use, or if material is delivered so far in advance that it may suffer damage or depreciation before being used, no estimate or allowance for the excess shall be made, if the Board so elects.

In case work is nearly suspended or in case only unimportant progress is being made, the Engineer may, at his discretion, make progress estimates at greater intervals than once a month.

Upon such progress estimate being made and certified in writing to the Board, the District shall, within 10 days after the date of the estimate, pay to the Contractor the amount due him under such estimate; provided, however, that the District may at all times reserve and retain from such amount, in addition to the 10 per cent heretofore mentioned, any sum or sums which, by the terms hereof, or of any law of the State of Ohio, it is or may be authorized or required to reserve or retain.

0.21 Final Payment.—Whenever, in the opinion of the Engineer, the work covered by this Contract has been completed, he shall so certify in writing to the Board, and shall submit a final estimate, showing the total amount of work done by the Contractor, and its value under and according to the terms of this Contract;

any other amounts due the Contractor; all deductions made in accordance with the provisions of the Contract; the total of all previous payments; and the amount due the Contractor under such final estimate. On or before the expiration of 30 days after date of the acceptance of the work by the Board, the District shall pay to the Contractor the amount due him on the final estimate. Provided, however, that before he shall be entitled to payment of such amount, the Contractor shall execute and file with the Board, a release, in proper form, of all claims against the District on account of this Contract, except for the Contractor's equity in the amounts kept or retained under the terms of this Contract; and except for the interest, if any, due on the final estimate, as provided hereinafter; and except any other claims that have theretofore been filed in accordance with the provisions of the Contract, which are listed and itemized in detail in a statement attached to and made a part of such release, giving reasons for, nature of, and amount of each claim so listed. All prior estimates upon which payment may have been made, shall be superseded by the final estimate.

0.22 **Payment by Check.**—Payment may be made by check signed by the properly authorized officers of the District. The Contractor shall designate some bank or other agent within the limits of the Miami Conservancy District, authorized by him to receive payments on progress estimates, unless otherwise agreed upon between the Contractor and the Board.

0.23 **Delayed Payments.**—Should any payment due the Contractor on any estimate be delayed, through fault of the District, beyond the time stipulated, such delay shall not constitute a breach of contract or be the basis for a claim for damages, but the District shall pay the Contractor interest on such amount at the rate of 6 per cent per annum for the period of such delay. The term for which interest will be paid shall be reckoned, in the case of progress estimates, from the 10th day after date of the estimate, to the date of payment of the estimate; and in case of the final estimate, from the 30th day after the acceptance, to the date of payment of the final estimate. The date of payment of any estimate shall be considered the day on which the payment is made or offered as evidenced by the records of the Board's office. If interest shall become due on any progress estimate, the amount thereof, as determined by the Board shall be added to a succeeding estimate. If interest shall become due on the final estimate, it shall be paid on a supplementary voucher prepared by the Board; provided, how-

ever, that the Contractor shall not be entitled to interest on any sum or sums which by the terms hereof the District may be authorized to reserve or retain.

0.24 Payment Only in Accordance with Contract.—The Contractor shall not demand, nor be entitled to receive, payment for the work or materials, or any portion thereof, except in the manner set forth in this Contract, and after the Engineer shall have given a certificate for such payment.

0.25 Money Retained for Defects and Damages.—The Contractor shall pay to the District all expenses, losses and damages, as determined by the Engineer, incurred in consequence of any defect, omission, or mistake of the Contractor or of his employees, or the making good thereof, and the District may apply any moneys which otherwise would be payable at any time hereunder, to the payment thereof.

0.26 Claims for Damages.—It is agreed that if the Contractor shall claim compensation for any alleged damage by reason of the acts or omissions of the Board, or its agents, he shall, within 10 days after the sustaining of such damage, make a written statement to the Engineer of the nature of the alleged damage. On or before the last day of the month succeeding that in which any such damage is claimed to have been sustained, the Contractor shall file with the Engineer an itemized statement of the details and amount of such damage, and upon request of the Engineer shall give him access to all books of account, receipts, vouchers, bills of lading and other books or papers containing any evidence of the amount of such damage. Unless such statement shall be filed as thus required, his claim for compensation shall be forfeited and invalidated, and he shall not be entitled to payment on account of any such damage.

0.27 Remedies Cumulative.—Any remedy provided in this Contract shall be taken and construed as cumulative, that is, additional to each and every other remedy herein provided.

0.28 Acceptance Shall Not Constitute Waiver.—No order, measurement, determination, or certificate by the Engineer, or order by the Board for payment of money, or payment for, or acceptance of the whole or any part of the work by the Engineer or the Board, or extension of time, or possession taken by the Board or its employees, shall operate as a waiver of any portion of this Contract or of any power herein provided, except as provided for in Section 0.8

of these Specifications, entitled **Retaining Imperfect Work**; nor shall any waiver of any breach of this Contract be held to be a waiver of any other or subsequent breach.

0.29 Collateral Works.—The Board reserves the right to have such agent or agents as it may elect enter the property or location on which the works herein contracted for are to be constructed or installed, for the purpose of constructing or installing such collateral works as said first party may desire, or for the construction or reconstruction of railroads, traction lines, telephone and telegraph lines, highways or other works affected by the improvement. Such collateral works will be constructed or installed with as little hindrance or interference as possible with the Contractor. The party of the second part hereby agrees not to interfere with, or prevent the performance of, any collateral work by the agent or agents of the party of the first part.

0.30 Persons Interested in Contract.—The Contractor hereby declares that no other person or corporation has any interest hereunder as Contractor.

This Contract shall be void if any member of the Board of Directors of The Miami Conservancy District, or other officer of the District, or any person in the employ of the Board of Directors, or of the District, is, or shall become, directly or indirectly, interested as contracting party, partner, stockholder, surety or otherwise, in the performance of the Contract, or in the supplies, work or business to which it relates, or in any portion of the profits thereof; provided, however, that incidental and unintentional interest, such as ownership of stock or interest in a railroad, telephone, electric traction or other company which may, as an incident to its usual business, furnish services or supplies to the Contractor, shall not be included within the meaning of this provision.

0.31 Personal Attention of Contractor.—The Contractor shall give his personal attention constantly to the faithful prosecution of the work, and shall be present, either in person or by a duly authorized representative on the site of the work, continually during its progress. He shall maintain an office on or adjacent to the site of the work, and shall at all times keep in said office a complete copy of the Specifications and Drawings.

0.32 Contractor's Address.—Both the address given in the bid or proposal upon which this Contract is founded, and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters and other communica-

tions to the Contractor shall be mailed or delivered. The delivering at either of the above named places of any notice, letter or other communication from the Board or its Agents to the Contractor shall be deemed sufficient service thereof upon the Contractor, and the date of said service shall be the date of such delivery. The first named address may be changed at any time by notice from the Contractor to the Board. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon the Contractor personally.

0.33 Agents, Superintendents and Foremen.—When the Contractor is not present on any part of the work where it may be desired to give directions, orders may be given by the Engineer and shall be received and obeyed by the Superintendent or Foreman who may have charge of the particular part of the work in reference to which orders are given.

0.34 Compliance with Laws.—The Contractor shall keep himself fully informed of all laws, ordinances, and regulations in any manner affecting those engaged or employed in the work, or the materials and appliances used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having jurisdiction or authority over the same. He shall at all times himself observe and comply with, and shall cause his agents and employees to observe and comply with, such existing and future laws, ordinances, regulations, orders and decrees; and shall protect the District against any claim or liability arising from or based upon the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees.

0.35 Character of Employees.—The Contractor shall employ only competent, skillful, faithful and orderly men to do the work, and whenever the Engineer shall notify the Contractor, in writing, that any man on the work is, in his opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, the Contractor shall discharge such man from the work, and shall not again employ him, except with the written consent of the Engineer.

0.36 To Maintain Communications.—The Contractor shall build and maintain temporary bridges, roads, railroads, telegraph and telephone lines and other means of communication where such communication is interfered with on the work of his Contract, and shall provide for convenient access to the various parts of the work and to adjacent private property which may be affected by the work. He shall provide such temporary fences or guards as

may be necessary either to keep live stock on adjoining property from entering the lands occupied by the works, or to make roads and other communications safe by night as well as by day.

In case, in the opinion of the Engineer, such temporary works are dangerous or insufficient, the Contractor shall bring them to the condition of safety or sufficiency required by the Engineer. He shall not disturb, close or obstruct any existing highways or other communications until he has obtained permits therefor from the Engineer.

The Contractor shall be responsible for the sufficiency and safety of all such temporary works, and shall be responsible for all damage resulting from their insufficiency, either in construction, maintenance or operation.

0.37 To Guard Against Accidents.—The Contractor, at all times throughout the performance of this Contract, shall take all precautions necessary to effectually prevent any accident in any place affected by his operations in consequence of the work being done under this Contract, and shall, to this end, put up and maintain suitable and sufficient barriers, signs, lights, or other necessary protection.

The Contractor shall save harmless the District from any suits or claims of every name or description brought against it, for and on account of any injury or damage to person or property, received or sustained by any person or persons, by or from the Contractor or any duly authorized sub-contractor or any agent, employee or workman, by or on account of work done under this Contract, or any extensions or additions thereto, whether caused by negligence or not, or by or in consequence of any negligence in guarding the same, or any material or explosives used or to be used for the same, or by or on account of any material, implement, appliance or machine used in its construction; or by or on account of any accident or of any act or omission of the Contractor or of any duly authorized sub-contractor or any agent, employee or workman.

The Contractor agrees that so much of the money due him under this Contract as shall be considered necessary by the Board may be retained until all suits or claims for damages as aforesaid have been settled and evidence to the effect has been furnished to the Board.

0.38 Contractor Responsible for Claims.—The Contractor shall assume the defense of, and save harmless, the District from all claims of any kind arising from his operations in the performance of the Contract. But he shall not be held responsible for damage which is inevitable or necessary because of the nature of the im-

provement, and which does not result in any way from his manner of doing the work, such as flooding of lands above the permanent dams.

0.39 Hindrances and Delays.—The risks and uncertainties in connection with the work are assumed by the Contractor as a part of this Contract, and are compensated for in the contract price for the work. The Contractor, except as otherwise definitely specified in this Contract, shall bear all loss or damage for hindrances or delays, from any cause, during the progress of any portion of the work embraced in this Contract, and also all loss or damage arising out of the nature of the work to be done, or from the action of the elements, inclement weather and floods, or from any unforeseen and unexpected conditions or circumstances encountered in connection with the work, or from any other cause whatever; and except as otherwise definitely specified in this Contract, no charge other than that included in the contract price for the work, shall be made by the Contractor against the District for such loss or damage.

Should the work be stopped by order of the party of the first part for any cause other than those authorized in this Contract, then and in that event, such expense as, in the opinion of the Engineer, is caused to the Contractor thereby, other than the legitimate cost of carrying on this Contract, shall be paid by the party of the first part.

0.40 Night Work.—Unless otherwise specified or ordered by the Engineer, work may be done by night as well as by day, and night work may be required if necessary in exigencies, or to complete work on which night work is feasible. But no night work of any kind shall be done without the knowledge of the Engineer.

Where night work is in progress sufficient lights shall be provided to safeguard the workmen, and the public, and to afford adequate facilities for properly placing and inspecting the materials.

For night work the Contractor shall receive no extra compensation, but the compensation for such work and all expenses incident thereto shall be considered as included in the contract price.

0.41 Delivery of Materials.—Materials to be used for work under this Contract shall be delivered sufficiently in advance of their proposed use to prevent delays, and they shall be delivered approximately in the order required.

The Engineer shall be notified a reasonable time in advance of the proposed manufacture of metal-work, so that arrangements may be made for inspection.

0.42 Infringements of Patents.—The Contractor shall be held responsible for any claims made against the District for any infringements of patents by the use of patented articles, or methods, used by him in the construction and completion of the work, or any patented process connected with the work agreed to be performed under the Contract, or of any patented materials used upon the said work, and shall save harmless the District from all costs, expenses and damages which the District shall be obliged to pay by reason of any infringement or alleged infringement of patents used in the construction and completion of the work.

0.43 Protection Against Claims for Labor and Material.—The Contractor agrees that he will save harmless the District from all claims against it for material furnished or work done under this Contract.

It is further agreed by said Contractor that he shall, if so requested, furnish the Board with satisfactory evidence that all persons who have done work or furnished material under this Contract have been duly paid for such work or material, and in case such evidence is demanded and not furnished as aforesaid, such amount as may in the opinion of said Board be necessary to meet the claim of the persons aforesaid may be retained from the money due said party of the second part under this Contract until satisfactory evidence be furnished that all liabilities have been fully discharged.

When required by the laws of Ohio, moneys due the Contractor may be retained for protection against claims.

0.44 Assignment.—The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract, or his right, title or interest in or to the same or any part thereof, without the previous consent in writing of the Board. If the Contractor shall, without such previous written consent, assign, transfer, convey, sublet, or otherwise dispose of this Contract, or of his right, title, or interest therein, to any other person, company or other corporation, or by bankruptcy, voluntary or involuntary, or by assignment under the insolvency laws of any state; this Contract may at the option of the Board be revoked and annulled, and the District shall thereupon be relieved and discharged from any and all liability and obligations growing out of the same to the Contractor, and to his assignee, trustee, or transferee; and no right under this Contract, or to any money to become due hereunder shall be asserted, excepting as provided herein, against the District, in law or equity

by reason of any so-called assignment of this Contract, or any part thereof, or of any moneys to become due hereunder, unless authorized as aforesaid by the written consent of the Board.

0.45 Removal of Equipment.—The Contractor shall not sell, assign, mortgage, hypothecate, or remove equipment or materials which have been installed and which may be necessary for the completion of the Contract, without the written consent of the Engineer.

0.46 Termination of Contract if Abandoned, Assigned, Delayed or Violated.—If the work to be done under this Contract shall be abandoned by the Contractor, or if this Contract shall be assigned, or placed in bankruptcy, or the work sublet by him, otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the Board, that the performance of the Contract is unnecessarily or unreasonably delayed, or that the Contractor is violating any of the conditions or agreements of this Contract, or is executing the same in bad faith or not in accordance with the terms thereof, or is not making such progress in the execution of the work as to indicate its completion within the time specified in this Contract, or within the time to which the completion of the Contract may have been extended by the Board, the Board may notify the Contractor to discontinue all work or any part thereof, under this Contract, by a written notice to be served upon the Contractor as hereinbefore provided, and a copy of which notice shall be given to his Surety, or the authorized agent for the latter; thereupon the Contractor shall discontinue the work, or such part thereof as the Board shall designate, and thereupon, the Surety may, at its option, assume this Contract, or that portion thereof on which the Board has ordered the Contractor to discontinue work, and proceed to perform the same, and may, with the written consent of the Board, sublet the work or portion of the work so taken over; provided, however, that the Surety shall exercise its option, if at all, within two weeks after written notice to discontinue work has been served upon the Contractor and upon the Surety or its authorized agent. The Surety, in such event, shall take the Contractor's place in all respects, and shall be paid by the party of the first part for all work performed by it in accordance with the terms of this Contract; and if the Surety under the provisions hereof shall assume said entire Contract, all moneys remaining due the Contractor at the time of his default, shall thereupon become due and payable to the Surety as the work progresses, subject to all of the terms of this Contract.

In case the Surety does not, within the hereinbefore specified

time, exercise its right and option to assume this Contract or that portion thereof on which the Board has ordered the Contractor to discontinue work, then the Board shall have the power to complete by contract or otherwise, as it may determine, the work herein described, or such part thereof as it may deem necessary, and the Contractor agrees that the Board shall have the right to take possession of and use any of the materials, plant, tools, equipment, supplies and property of every kind provided by the Contractor for the purpose of his work, and to procure other tools, equipment and materials for the completion of the same, and to charge to the Contractor the expense of said contracts, labor, materials, tools and equipment and expenses incident thereto. The expense so charged shall be deducted by the District out of such moneys as may be due or may at any time thereafter become due the Contractor under and by virtue of this Contract, or any part thereof. The Board shall not be required to obtain the lowest figures for the work of completing the Contract, but the expense to be deducted shall be the actual cost of such work. In case such expense is less than the sum which would have been payable under this Contract if the same had been completed by the Contractor, then the Contractor shall be entitled to receive the difference; and in case such expense shall exceed the amount which would have been payable under the Contract if the same had been completed by the Contractor, then the Contractor shall pay the amount of such excess to the District on notice from the Board of the excess so due; but such excess shall not exceed the amount due, under this Contract, at the time the Contractor is notified to discontinue said work, or any part thereof, plus the amount of the bond or bonds executed by the Contractor for the performance of this Contract. When any particular part of the work is being carried on by the Board, by contract or otherwise, under the provisions of this section, the Contractor shall continue the remainder of the work in conformity with the terms of this Contract, and in such manner as in nowise to hinder or interfere with the persons or workmen employed, as above provided, by the Board.

0.47. Board for Engineer and Assistants.—In cases where the Contractor maintains a camp for lodging and feeding employees, he shall, when requested, furnish board or lodging to the Engineer and his assistants, and shall charge the District therefor at the rate of 25c per meal or lodging, or $5.00 per man per week. He shall not furnish such meals and lodging gratis, but shall submit monthly itemized statements to the Engineer of such meals and lodging furnished, for which payment shall be made by the District.

0.48 Police and Sanitary Regulations.—The Contractor and his employees shall promptly and fully carry out the police and sanitary regulations as hereinafter described or as may from time to time be prescribed by the Engineer, to the end that proper work shall be done, good order shall prevail, and the health of employees and of the people using water from the drainage areas, and of the local communities affected by the operations under this Contract, may be conserved and safeguarded. The Contractor shall summarily dismiss and shall not again engage, except with the written consent of the Engineer, any employee who violates the police or sanitary regulations.

0.49 Intoxicants.—The Contractor shall not sell, nor shall he permit or suffer the introduction or use of, intoxicating liquor upon the works embraced in this Contract, or upon any of the grounds occupied or controlled by him.

0.50 Camps.—The Contractor shall if necessary provide suitable and satisfactory buildings for the housing, feeding and sanitary necessities of the men. Such quarters shall provide an amount and arrangement of space per man which will be sufficient and suitable for the maintenance of cleanliness, decency and health. Fly screens shall be provided wherever and whenever necessary. Plans for such quarters shall be submitted to and approved by the Engineer before the quarters are built. The Contractor shall also provide suitable stabling for the animals employed upon the work. All such buildings shall be located only at places approved by the Engineer. The stables shall be at an approved distance from the quarters for men.

The Contractor shall provide at convenient points an ample supply of drinking water of proper quality, and ample shower baths and clothes-washing facilities with hot and cold water, for his employees.

In case of temporary camps or work in or near cities where camps need not be maintained, or of sanitary conveniences away from camp, the provisions concerning camps, drinking water, sanitary conveniences and garbage may be modified to suit the case, upon the written consent of the Engineer.

0.51 Sanitary Conveniences.—Buildings for the sanitary necessities of all persons employed on the work, beginning with the first person employed, shall be constructed and maintained by the Contractor, in the number, manner and places approved or ordered. Unless other types are submitted by the Contractor and approved

by the Engineer, these conveniences shall be of an approved incinerator type, except that closets having watertight removable receptacles may be used in special cases if and as permitted. All persons connected with the works shall be obliged to use these conveniences. Satisfactory precautions shall be taken to render the interior of the incinerators and other closets inaccessible to flies. All excreta shall be incinerated daily. The Contractor shall rigorously prohibit the committing of nuisances.

0.52 Garbage and Camp Refuse.—Garbage, both liquid and solid shall be promptly and satisfactorily removed by the Contractor from the buildings, and immediately placed in approved tight receptacles of sufficient capacity for about one day's ordinary production. At least once each day all such garbage shall be incinerated or otherwise thoroughly and satisfactorily disposed of; provided that the Contractor may if he prefers, provide running water in kitchens and other buildings, and dispose of liquid waste and sewage by means of approved drains and cesspools.

The Contractor shall clean of refuse the camp stable, and adjoining grounds at least twice each week, particular care being exercised to prevent conditions which lead to the breeding of flies, mosquitos or other disease-carrying insects or vermin.

In case the Contractor shall neglect or refuse to keep the premises in a clean and sanitary condition, the Engineer may have the work done which in his opinion is necessary to accomplish this purpose, and the cost thereof shall be charged to the Contractor.

0.53 Doctors, Hospitals.—The Contractor shall retain the services of one or more acceptable qualified medical and surgical practitioners, who shall have the care of his employees, shall inspect their dwellings, the stables and the sanitaries as often as necessary or required, and shall supply medical attendance and medicine to the employees whenever needed. The Contractor shall make satisfactory arrangements for hospital service for the proper care of sick or injured employees, and shall give the Engineer satisfactory assurance that the above medical and hospital arrangements have been made. At such places as directed, all articles necessary for giving First Aid to the Injured shall be provided.

0.54 Medical Supervision.—The medical supervision of the Contractor over his employees shall extend to the physical examination of all applicants for employment, in order to prevent persons having communicable diseases which would make them a menace to other employees, from being connected with the work, and the

Contractor shall employ only persons shown by such examinations to be free from such communicable diseases. Whenever, in the opinion of the Engineer, it is necessary for the protection of the public health or the health of the employees, the Contractor shall remove from the work to a hospital, or shall remove permanently from the work or from any camp, any employee whose presence is believed to endanger the health of other persons.

0.55 Medical Report.—Once each week, or more frequently if required, the Contractor shall give the Engineer, in such detail as may be prescribed from time to time, a written report signed by a physician in regular attendance, setting forth clearly the health conditions of the camp or camps and of the employees. If any case of communicable disease, or any case of doubtful diagnosis is discovered, it shall be reported at once to the proper authority and to the Engineer, and the Contractor shall take immediate steps to safeguard the interests of his employees, and the public in general.

0.56 Examinations.—The Engineer shall have the right, in order to determine whether the requirements of this Contract as to sanitary matters are being complied with, to enter and inspect, in person or by agent, any camp or building or any part of the work, and to cause any employee to be examined or to be vaccinated or otherwise treated; also to inspect the drinking water and food supplied to the employees.

0.57 No Direct Compensation.—No direct payment will be made for any work or materials required to meet the sanitary requirements hereinbefore specified, but compensation therefor shall be considered as having been included in the Unit Prices stipulated in the Agreement.

0.58 Water Supply.—The Contractor shall provide at convenient points an ample supply of water of proper quality for all the operations required under this Contract. A proper piping system shall be installed, maintained, and extended from time to time, to distribute this water to the various portions of the work and plant where it is needed. Whenever necessary, the water shall be under sufficient pressure to give an effective stream from a nozzle for cleaning rock or other surfaces on or against which concrete or masonry is to be built; for washing stones to be used in concrete; for sprinkling, for puddling, and for other purposes. Hose connections and hose, water-casks or other sufficient means, shall be provided also for fighting fires in the more important temporary structures and construction plants, and responsible persons shall be instructed as to the operation of such fire apparatus, so as to prevent or minimize loss of time from fire. These provisions may be waived or modified on any contract by the Engineer to the extent to which in his judgment the limited importance or the nature of the work may justify.

0.59 Pumps and Drains.—The Contractor shall provide all the necessary pumps, temporary pipes, drains, ditches, and other means for removing water from the excavations or other parts of the work, or for preventing the slopes of excavations or embankments from sliding or caving, and he shall, where necessary, satisfactorily remove the water. All compensation for, and all expense incidental to, the fulfillment of the provisions of this section, unless otherwise specifically provided, shall be considered as having been included in the prices stipulated in the Agreement.

0.60 Borrow Pits.—The Contractor may, without charge therefor, open gravel pits, sand pits, or other borrow pits upon lands controlled by the District, but no materials obtained therefrom shall be estimated for payment under any excavation item, except as otherwise specifically provided herein. The location of all borrow pits shall be subject to the approval of the Engineer. It is the intention that all borrow pits shall be left at the termination of work under this Contract in as sightly a condition as practicable. To this end borrow pits shall be shaped and graded as shown on the Drawings, or as ordered. All stumps, boulders or debris, shall

be satisfactorily disposed of. If ordered, the surface shall be covered with soil of designated thickness and grassed. With the exception of the surface dressing and grassing, if ordered, which will be paid for under Item 38, and clearing and grubbing, if ordered, which will be paid for under Item 2. No direct payment shall be made for any of the above work, but compensation shall be considered as having been included under the item for which the materials are used.

Where permitted, excavations which are not to be lined with concrete may be enlarged beyond the prescribed limits to obtain materials for construction or for other purposes of the Contractor, but such enlargement of the excavations shall not be paid for under any of the excavation items, except as otherwise specifically provided herein; nor shall any direct payment be made for excavations of whatever nature, not a prescribed part of the permanent structures, which may be made for any purposes of the Contract in connection with the plant, equipment or operations incidental to construction.

0.61 Protection of Trees.—Trees, shrubs, and other obstructions shall be removed from areas other than the sites of the proposed structures only to the extent directed or permitted. Where required, trees or shrubs which are not to be removed under this Contract shall be satisfactorily protected by the Contractor from injury.

0.62 Materials Obtained from Construction.—Materials from the excavations, or from clearing or stripping or other operations, which are suitable and required, shall be used in the construction, as and where directed or permitted, and shall be paid for according to the class of work in which they are used, in addition to the price paid for original removal except in the case of embankment material for streets and highways, and of material for refilling excavations where such refill is not designated to be paid for as backfilling. Materials which are not suitable, or for any other reason are not used in the work, shall be satisfactorily disposed of. Earth and rock not used in the construction shall be deposited in spoil banks, which shall be located only at such places as are designated by the Engineer. Spoil banks shall be shaped and graded as directed and may be covered with soil of designated thickness and grassed, the intention being to leave the finished work in as sightly a condition as practicable. Compensation for depositing and grading materials in spoil banks shall be considered as having been included in the prices bid for the excavation, except as provided in Item

12, Excavation—Overhaul for River Channel Improvements. Where it is ordered that spoil banks be covered with top soil and grassed, payment for this work shall be made under Item 38, Surface Dressing and Grassing.

0.63 Assistance in Making Tests.—The Contractor shall render such aid as may be required for making tests of the bearing power of earth, and of the character of foundations; for digging test pits; and for making any other excavations for that purpose which may be directed. Such assistance shall be paid for under Section 0.19 of the Specifications, entitled Extra Work.

0.64 Protection of Existing Structures.—The Contractor shall carefully protect from injury any existing buildings, foundations, fills, land, pavements, pipes, conduits, sewers, drains, cisterns, wells, railway tracks or other works, property or structures that may be liable to injury by the work covered by this Contract, except in so far as the work of the Contract requires their modification or removal. He shall take all precautions necessary for such protection, and shall be fully responsible for, and shall make good, any injury to such works, property or structures that may occur by reason of his operations.

0.65 Excavation—Classification.—Excavation, as indicated on the Drawings or as determined by the Engineer, shall be classified as follows:

Class 1—Earth.—Earth, as a name for excavated material shall be used to include, (except where material is classified as Class 2, (Mixed Excavation) all glacial deposit, whether cemented or not, except solid boulders one-half cubic yard or more in volume; it shall include all alluvial deposits, and disintegrated material lying on top of ledge rock, and all material of whatever nature not properly included under Classes 2 or 3. It shall not include the Cincinnatian Formation, which consists of layers of clay below the glacial material, in which are imbedded thin horizontal layers of limestone from a fraction of an inch to a few inches in thickness. Neither shall it include earth or any material which has been classified on the Drawings as Class 2, Mixed Excavation.

Class 2—Mixed Excavation.—The term Mixed Excavation, as a name for excavated material, shall be used to include:

The material known geologically as the Cincinnatian Formation, which lies under the glacial deposits, and consists of thin, approximately horizontal layers of limestone, from a fraction of an

inch to a few inches thick, alternated with and imbedded in clay, and which may or may not require blasting for its removal; and,

Mixtures of any or all materials which, in the opinion of the Engineer, it is impracticable to classify as Class 1, Earth or Class 3, Rock, either because of the character of the material, or because of the method used in its removal.

Class 3—Rock.—Rock, as a name for excavated material, shall be used to include the solid ledge rock formation, whenever found, (except when classified as Class 2, Mixed Excavation) which is preglacial, and which can be removed properly only by means of explosives, barring or wedging, or by some other recognized method for quarrying solid rock. It shall include solid boulders of a half cubic yard or more in volume. It shall also include existing concrete, or masonry with mortar joints, which may be removed under instructions. It shall not include thin layers of limestone imbedded in clay, nor cemented gravel, nor any material classified as Class 2, Mixed Excavation.

0.66 Excavation—Work to be Done.—The necessary excavations shall be made for stripping foundations for embankments, for cut-off trenches, pipe trenches, discharge conduits and appurtenances, spillways, channels, drainage systems, permanent street and highway relocations and alterations, channel improvements, and for any other purposes necessary for the completion of all work contemplated under this Contract.

0.67 Excavation—Limits of.—The Drawings for the various structures show, as nearly as was practicable to determine beforehand, the depths, widths and slopes for the proposed excavations; but all such limits are estimated only, and will be finally determined from the nature of the materials encountered as the work progresses. No excavation outside the prescribed limits will be paid for except when so specifically provided.

Where concrete or masonry is to be built without forms against the sides or bottom of an excavation, especial care shall be taken to preserve the remaining material in an undisturbed condition. In such cases the material shall not be disturbed by machinery or by powder within 6 inches of the prescribed limits, unless with the Engineer's written permission. The remainder shall be removed by hand work, only a short time before placing the concrete or masonry. Should any material be removed beyond the prescribed limits, or be so deteriorated or loosened as, in the opinion of the Engineer, to require removal, the resulting spaces shall be refilled

at the Contractor's expense with concrete or other material as directed. All rock which shall have been loosened outside the prescribed lines shall be removed at the expense of the Contractor, unless allowed to remain by special permission of the Engineer.

Should it be found that a foundation on which concrete is to be placed deteriorates with exposure, special care shall be taken not to excavate it until immediately before covering it with concrete.

0.68 Excavation—Cleaning Surface for Inspection.—From time to time during the excavation of Rock or Mixed Excavation, whenever so directed, the surface of the material shall be cleaned, so that the area designated can be inspected to determine its quality.

0.69 Excavation—Use of Explosives.—The use of explosives in a manner which might disturb or endanger the stability, safety or quality of the work will not be allowed. Explosives shall be kept on hand by the Contractor in sufficient quantities to avoid delay on the work. Such explosives shall be stored, handled and used as prescribed by the laws and regulations of the State of Ohio and subdivisions thereof. The attention of the Contractor is directed to the Act of April 27, 1908, Section 5906, General Code of Ohio, which requires that he shall file a bond in the amount of $5,000 with the County Commissioners of each and every county in which the Contractor shall store or handle explosives in quantities exceeding 100 pounds.

0.70 Excavation—Finishing Work.—The slopes of all excavations which are to be dressed and grassed as hereinafter provided, or which are to remain permanently exposed, shall be finished to the prescribed lines in a careful and workmanlike manner. Slopes of all rock excavations which are to remain permanently exposed shall be trimmed to a reasonably uniform surface with maximum projections from the general surface of not more than one foot, unless otherwise permitted by the Engineer.

0.71 Excavation—Payment.—The excavation to be paid for shall include the quantity in cubic yards excavated in accordance with the Drawings, Specifications and instructions of the Engineer, measured in excavation unless otherwise specified under the respective items of excavation.

The unit prices stipulated for excavation items shall include the entire cost of making the excavations, and of refilling those portions that may be required, where such refilling is not designated for payment as backfilling or as embankment. These unit prices shall cover the cost of the maintenance of the excavations during con-

struction, including damming, pumping, bailing, draining, unwatering and other work necessary; provided, however, that when excavations are made for concrete or other structures the Engineer shall decide, in case the question arises, to what extent the maintenance of the excavation pertains to the excavation item or to the concrete or other item. Sheeting left in place by written order of the Engineer, will be paid for as provided under Item 89; otherwise the cost of placing and removal of sheeting and bracing shall be included in the price bid for excavation. These unit prices shall also include the cost of all other operations incidental to the excavation, and of the disposal of the materials excavated, except as provided in Section 0.62 of the Specifications, entitled Materials Obtained from Construction.

No payment will be made for excavation as **below mean low water level,** under Items 5a, 6a, 7a, 8a, 9a, 10a, etc., unless the estimated elevation of mean low water is shown and so designated, on the Drawings; in which case the estimated elevation shall be used as the dividing line, regardless of where the water level may be at the time the work is done. In cases where this estimated elevation is not shown, excavation of a given Class, whether above or below mean low water level, will be paid for at the unit price stipulated for excavation not below mean low water level.

0.72 Embankment—Work to be Done.—Embankment of the Class specified shall be constructed where shown on the Drawings or where required by the Engineer. Sections 0.73, 0.74, and 0.75 of the Specifications, entitled Embankment—Class A, B, and C, respectively, describe three methods of constructing embankments in the main dams. The decision as to which of these methods will be adopted will be made after the proposals are opened and compared, and will depend on the relative economy and merits of such methods considered in connection with the character of the material available for construction.

0.73 Embankment—Class A.—The term Class A Embankment shall be used to include embankment for main dams, constructed by **Hydraulic Monitor and Dredge Pump Method:** This method consists of washing down or otherwise delivering material to a dredge pump, which in turn delivers it under pressure through a discharge pipe onto the embankment. In washing down materials, properly constructed nozzles shall be used, with a sufficient flow of water, both as to velocity and quantity, to loosen the materials at the borrow pits, and sufficient additional water to insure the transportation from borrow pits to sump. The dredge pumps, pipes,

flumes, sluices, and other transporting equipment shall be carefully installed to meet all requirements for the proper placing of the materials in the embankment.

The outer slopes of the dam shall be carried up in advance of the central portion. The width of these outer levees, and the depth and width of the settling pond, will largely control the gradation of materials, and shall be subject at all times to the direction of the Engineer. Care shall be taken to place in the outer levees material which will conform to the requirements for the outer portion of the dam, and to satisfactorily compact such material. The material for the main body of the embankment shall be delivered near the outer edge of the embankment slopes, and so manipulated that the coarser material will remain near the outer slopes, and the finer materials will be carried toward the center, the finer materials being deposited in a settling pond so as to form an impervious core. It is of the utmost importance to avoid stratification within this core. To obtain satisfactory results, it will be necessary to sluice into settling ponds in which the water is from 2 to 6 feet deep and as wide as the width of the embankment at that elevation will allow. The delivery and manipulation of the materials shall be regulated so as to obtain the best distribution of material, and to keep the water surface of the settling pond as nearly uniform in width as possible. The bottom of settling ponds shall be kept approximately level longitudinally to prevent undue flow of silt to one end.

Sluicing operations shall be conducted at all times in such a manner as to give a puddled core of as uniform width and slopes as the nature of the material used will permit, and to raise both sides of the embankment evenly. Embankment operations shall, unless otherwise permitted in writing, be commenced in the deeper portion at the river section or at the stream control gap, and shall be carried as nearly level longitudinally as possible. Should the use of a series of settling ponds be permitted, they shall be of convenient lengths, separated by temporary cross dams of sufficient thickness to withstand the pressure against them, built of selected material and puddled by hand, or by some equally efficient method, to the satisfaction of the Engineer. As the sluiced material is washed against the temporary cross dam and raised in the embankment, the stratification between it and the cross dam shall be broken by the use of shovels or other suitable tools.

Drainage of surplus water from a higher to a lower settling pond may be permitted if suitable means for such drainage is provided. Whenever the waste water carries silt from one settling pond to an-

other, the outlet shall be immediately raised or sluicing operations in that pond discontinued until such time as this condition has been remedied. The Contractor shall take care of all excess water in the settling pools by means of wells, built up in sections, discharging at approved points, or by pumping, siphoning, or other approved methods. Such devices shall provide for the removal, at the desired elevation, of the comparatively clean water at the surface of the settling pool, while affording ample opportunity for the finer particles to settle properly. Before the completion of all the work, any outflow device within the dam shall be satisfactorily filled with concrete or other acceptable material unless otherwise ordered. No outflow device which will remain within the dam shall be installed until written permission for such installation has been obtained from the Engineer; and such permission will not be given until evidence satisfactory to the Engineer, has been presented to show that adequate provisions can and will be made for completely and satisfactorily filling such device wherever necessary, before the completion of the work. The cost of all labor and all materials required under the provisions in this section, shall be included in the price stipulated in the Agreement.

Variations of this method during construction, which will accomplish equally effective results, will be considered.

0.74 Embankment—Class B.—The term Class B Embankment shall be used to include embankment for main dams, constructed by the **Semi-Hydraulic Method**, as follows: The material shall be obtained from borrow pits, or from excavations, transported in cars or by other suitable means, dumped at the outer edge of the embankment slopes, and sluiced toward the center of the dam. In depositing the material in the dam, care shall be taken where necessary, to place the coarser material in the downstream portion of the dam and the finer material in the upstream portion. The sluicing shall be carried on in such a manner that the coarser material will remain near the outer slopes of the embankment, and the finer material will be carried toward the center, the finest material being deposited in a settling pond so as to form an impervious core. It is of the utmost importance to avoid stratification within this core. To obtain satisfactory results, it will be necessary to sluice into settling ponds in which the water is from 2 to 6 feet deep and as wide as the width of the embankment at that elevation will allow. The quantity and pressure of water, and the direction and point of application of the stream, shall be regulated according to the nature of the material so as to obtain the best distribution of

material, and to keep the water surface of the settling pond as nearly uniform in width as possible. The material of the upstream slope shall not be washed clean, as it is desired to have a certain percentage of clay and sand retained near the upstream slope. The bottoms of settling ponds shall be kept approximately level longitudinally to prevent undue flow of silt to one end.

Sluicing shall be done at all times in such manner as to give a puddled core of as uniform width and slopes as the nature of the material used will permit, and to raise both sides of the embankment evenly, and the quantity or direction of the sluicing stream shall be changed as required to obtain this result. The material shall be so placed on the slopes and sluiced or puddled in such a manner that it will be compacted by water as close as practicable to the outer edge of the finished slopes. Embankment operations shall, unless otherwise permitted in writing, be commenced in the deeper portion at the river section, or at the stream control gap, and shall be carried as nearly level longitudinally as possible. Should the use of a series of settling ponds be permitted, they shall be of convenient lengths, separated by temporary cross dams of sufficient thickness to withstand the pressure against them, built of selected material and puddled by hand, or by some equally efficient method, to the satisfaction of the Engineer. As the sluiced material is washed against the temporary cross dam and raised in the embankment, the stratification between it and the cross dam shall be broken by the use of shovels or other suitable tools. The Contractor shall take care of all excess water in a satisfactory manner.

The cost of all labor and materials required under the provisions of this section shall be included in the price stipulated in the Agreement.

0.75 **Embankment—Class C.**—The term Class C Embankment shall be used to include embankment for main dams, constructed by the **Sprinkling and Rolling Method**, as follows: The embankment shall be built as nearly as possible in horizontal layers, each layer not exceeding 6 inches in thickness when acceptably compacted. Unless the earth is sufficiently moist when spread, each layer shall be wet so as to secure the desired compacting, and if required, the top of the embankment shall be wet just before a layer of earth is spread. The wetting shall be done in a manner which will avoid the formation of pools of water, and will secure the uniform moistening of all portions of embankment. Compacting shall be accomplished by not less than 12-ton, 3-wheeled steam rollers or traction engines with grooved, banded or corrugated rolls. The roller

shall pass over every part of each layer that can be traversed by the roller, as many times as may be necessary to thoroughly compact it. The distributing, wetting, and rolling shall be done to the satisfaction of the Engineer. Any places that become boggy or springy shall be corrected to the satisfaction of the Engineer, or as much material as necessary shall be removed and the hole refilled in a satisfactory manner. Embankment operations shall, unless otherwise permitted in writing, be commenced in the deeper portion at the river section or at the stream control gap. Unless otherwise permitted in writing, the embankment shall be carried up approximately level, and in any case the top of unfinished embankment shall not have a slope steeper than 10 to 1 in any direction. Portions of the embankment which are small in area, portions next to walls, and other portions which the rollers cannot reach for any reason, shall be formed of selected materials compacted by means of extra heavy tampers used energetically, or if permitted, by depositing the earth through water in such a manner that all of it shall be thoroughly saturated, or by other means which will secure a degree of compacting at least equivalent to that obtained by rolling as specified. All stones over 4 inches in diameter shall be removed from the portion of the embankment required to be water tight. Stones permitted to remain shall be separated one from another by earth, and in no case shall they be allowed to collect in nests. Stones and cobbles removed from the impervious portions of the embankment shall be placed on the slopes in the manner and to the extent directed. The cost of all labor and materials required under the provisions of this section shall be included in the price stipulated in the Agreement.

0.76 Embankment—Class D.—The term Class D Embankment shall be used to include embankments for levees built from material taken from river channel excavation and constructed as follows:

The embankment shall be carried up in approximately horizontal layers, extending entirely through the fill. Where the material is deposited in a wet condition, the layers shall be not more than 3 feet in thickness, but where the material is deposited in other than a wet condition the layers shall not exceed 1 foot in thickness, and some means satisfactory to the Engineer shall be used for compacting it. Such precautions shall be taken as will preserve the slopes and prevent improper segregation of materials. The object is to secure a compact, stable, reasonably impervious embankment, conforming to the prescribed lines. To allow for shrinkage and settlement, sufficient overfill not to exceed 10 per cent, shall be made by

the Contractor at the time of depositing the material. Where embankment is joined to a fill previously placed, or to a natural bank, a satisfactory bond shall be secured between the old and new materials by breaking the old surface or otherwise.

0.77 Embankment—Class E.—The term Class E Embankment shall be used to include embankment for levees built from material taken from borrow pits. It shall be constructed according to the specifications for Class D Embankment, as set forth in Section 0.76 of the Specifications.

0.78 Embankment—Class F.—The term Class F Embankment includes such miscellaneous embankments or fills as are so designated on the Drawings or by the Engineer, in which no special requirements are made as to compacting.

0.79 Embankment—Preparation of Foundation.—Unless otherwise directed the sites of embankments shall be prepared as regards clearing and grubbing, removal of buildings and soil stripping, as specified under Items 2, 3, and 5, to the end that all perishable or otherwise objectionable matter shall be removed. When, in the opinion of the Engineer, sufficient soil has been removed, and material has been uncovered to provide a suitable foundation for the purposes intended, the surface of the material so uncovered shall be picked, plowed, or otherwise satisfactorily roughened, as directed, to make a bond with the embankment material.

Springs encountered in the base of the embankment shall be satisfactorily controlled by plugging, draining, or other approved methods. When advisable, springs shall be led into the outlet channel or away from the embankments, as directed. Approved excavation and materials for this purpose shall be paid for under the appropriate items.

The provisions of this section may be waived or modified as may seem desirable or permissible, in cases where Class F Embankment is specified.

0.80 Embankment—Materials to be Used.—Embankments shall be made of acceptable materials from the excavations, or from borrow pits located on land provided by the District. Such materials shall be carefully selected and shall contain a sufficient proportion of fine particles to render the embankment reasonably impervious to water. The maximum size, quantity, and placing of large stones, shall be as allowed by the Engineer. The material shall be sufficiently stable not to slide or slough at the prescribed slopes, under a condition of saturation. Where feasible to do so,

all material from the excavations which are suitable for the purpose shall be placed in the embankment. No frozen material shall be placed in any portion of the embankment by any method whatsoever, nor shall any material be placed on a frozen surface, and operations shall be suspended when, in the opinion of the Engineer, ice conditions are such as to be objectionable. Care shall be taken that no earth not acceptable for embankment purposes, or any roots, brush or other perishable material be incorporated within the embankment. All timber, posts, trestles, staging, etc., shall be removed to the extent directed by the Engineer.

Where Class A, Class B or Class C Embankment is specified, it is the intention that the outer portion of the dam shall be composed of coarse material which shall be permanently stable under a condition of complete saturation. Any material which has a tendency to slough, slide or wash when subjected to any condition which may reasonably be expected to occur, will not be acceptable. The center portion of the dam shall be composed of material containing sufficient clay or other finely divided particles to be highly impervious to water. To obtain these results the Contractor shall use only carefully selected materials. Where the material from one borrow pit does not contain the requisite coarse and fine particles in the desired proportions, other sources shall be utilized, and if necessary to obtain satisfactory results, more than one class of material shall be deposited at the same time in the same or different portions of the embankment.

The provisions of this section shall not apply to Class F Embankment, and may be waived or modified as to Class D Embankment.

0.81 Embankment—Finishing Work.—The slopes and tops of all embankments that are to be dressed and grassed, or which are to remain exposed, shall be finished in a careful and workmanlike manner.

0.82 Embankment—Payment.—The embankment to be paid for shall include the quantity in cubic yards deposited in accordance with the Drawings, Specifications and instructions of the Engineer, measured in embankment unless otherwise specified under the respective items for embankment, and properly placed within the following limits: The prescribed neat limits for embankments, the contour of the natural ground or as left by the stripping, the prescribed limits for excavations the refilling of which is not included for payment under the provisions of Item 37, Backfilling, and the outside neat lines of any structures included within the embankment.

The unit prices stipulated for embankment items shall cover the entire cost of constructing the embankments, including the cost of preparing foundations (except as provided in this section), excavating from borrow pits, pumping, sluicing, transporting, and grading of materials, placing, puddling, draining, compacting, trimming slopes, refilling settlements and depressions, and all labor and materials necessary for doing the work in accordance with the requirements of the Contract, as well as the cost of maintaining embankments until the completion of the Contract. But such prices shall not include the cost of clearing and grubbing, removal of buildings, soil stripping, surface dressing and grassing, which shall be paid for under Items 2, 3, 5, and 38 respectively.

0.83 Backfilling—Description.—The term Backfilling shall be used to include refilling of trenches, and filling around structures in cases where the methods specified for building embankments in which the structures are located are not sufficient, or practicable, to secure satisfactory results. It is the intention to require backfilling around certain structures not only for refilling the excavation, but also, in some cases, for securing a compact, water-tight fill against the structures above the ground line. It may be required in trenches, where settlement subsequent to the first filling is undesirable, or where water-tightness is a requirement. The material shall be selected and placed with care. It may be deposited through water if practicable; otherwise it shall be deposited in layers about 6 inches thick, each layer being sprinkled as required, and well tamped, or rolled, before the next layer is placed.

Trenches in which pipes or conduits are laid, or in which sewers are built, shall be backfilled by tamping in 6-inch layers to a plane 2 feet above the top of the pipe, conduit, or sewer, above which plane the backfilling may be done by depositing the material through water if practicable; otherwise the tamping in layers shall be continued, or, if practicable and permitted, the layers shall be compacted by rolling.

Wherever backfilling is required, either in the Specifications, in the Drawings, or by the Engineer, it is evident that special care is necessary to accomplish the result desired, and the work shall be done carefully, and thoroughly, and strictly in accordance with instructions.

0.84 Backfilling—Material to be Used.—Materials used for Backfilling shall be carefully selected from the materials from the excavations, or from borrow pits if the former are not sufficient or suitable. The materials shall be free from roots, brush, or any

other perishable matter or material which will cause unduly prolonged settlement. Except as allowed by the Engineer frozen material shall not be used, nor shall backfilling be placed on or against a frozen surface. The maximum size, quantity and placing of large stones, shall be as allowed by the Engineer. Payments where allowed for backfilling will be made under Item 37 of the Detail Specifications.

0.85 Concrete—Description.—All concrete shall be composed of cement, fine aggregates, coarse aggregates, and water of the qualities hereinafter specified, and mixed in proportions to be prescribed by the Engineer. As the cement is to be paid for separately as a distinct item, the proportions of all the ingredients may be varied by the Engineer to suit the requirements of the various structures, and the Contractor shall make no claim for extra payment because of such variations in mixture, the contract price for each item being understood to apply to any mixture which may be specified. It is acknowledged that different local sands and gravels give widely different strength tests, and for this reason, and to accommodate the mixture to the detail requirements of the work, the Engineer shall order the proportions modified from time to time as may be necessary to obtain the best results.

The object is to secure dense, impervious concrete, except in cases where the chief requirement is weight rather than imperviousness; and the Contractor shall use only such materials, satisfactorily proportioned, mixed, and placed, as the Engineer may direct. From time to time tests will be made both of the materials in advance of construction, and also of the concrete actually being placed in the work. The Contractor shall furnish the cement and aggregates or concrete for all such tests, and shall give such assistance as may be required in facilitating tests. Except in special cases the proportions by volume are expected to range between 1 of cement, 2 of fine aggregate, and 4 of coarse aggregate for the richer mixtures; and 1 of cement, 3 of fine aggregate, and 6 of coarse aggregate for the leaner mixtures. In the construction of heavy walls, a rich mixture at the exposed face, and a leaner mixture at the back or in the body of the wall, may be required.

Large stones may be imbedded in concrete at the option of the Contractor whenever, in the opinion of the Engineer, the introduction thereof will be no detriment to the quality of the work.

0.86 Concrete—Cement.—Cement shall mean Portland cement, as defined by the Standard specifications for cement of the American

Society for Testing Materials revised to 1909, and published in the 1915 Year Book of that Society.

The cost of cement shall not be included in the unit prices bid for concrete, but will be paid for separately under Item 50, Cement.

0.87 Concrete—Fine Aggregate.—Fine aggregate or sand, shall be composed of grains from hard, tough, durable rocks, free from soft, decayed, friable or soluble material. It shall be clean, and shall not contain a sufficient quantity of organic silt, clay or other finely-divided matter to render it unsuitable. If objectionable quantities of silt or other matter adhere to the sand grains, the sand shall be satisfactorily washed. The size of the grains shall be acceptably graded from fine to coarse particles with no grains larger than will pass a one-fourth inch mesh screen. Sand, when mixed into mortar in the proportion by weight of 1 part cement and 3 parts sand may be rejected if it does not develop within 28 days, a compressive strength at least equal to the strength of a similar mortar made of the same cement and standard Ottawa sand, tested at the same age. The use of limestone screenings will not be allowed.

0.88 Concrete—Coarse Aggregate.—Coarse aggregate shall consist of clean, hard, durable, insoluble, broken stone, or gravel, of such size as to pass through a screen having 2½-inch round holes, and be retained on a ¼-inch mesh screen. It shall be acceptably graded in size between the limits prescribed. Coarse aggregate, as here defined, shall be used in all classes of concrete structures except the concrete linings of conduits for dams, and the concrete used in flexible slab revetment, in which cases coarse aggregate of smaller size shall be used, as specified under the appropriate items. Fragments of approximately the same size, or of flat, elongated shapes, or improperly graded, will not be satisfactory. Such screening, grading and washing shall be resorted to as will produce material of acceptable quality. **Run of crusher** or **run of bank,** i. e. gravel or stone containing a mixture of both the fine and coarse aggregates, shall not be used without screening.

In general the local gravels will be deemed satisfactory for use as coarse aggregate if properly screened and washed, but all such gravel shall be subject to test and approval by the Engineer under the provisions of Section 0.91 of the Specifications, entitled Samples. Few or none of the local ledge rocks are satisfactory for use as coarse aggregate.

0.89 Concrete—Water.—The water used in mixing concrete shall be reasonably clean and free from oil, acid, strong alkalies, or vegetable matter.

0.90 Concrete—Large Stones.—Where permitted, clean, sound, non-oil-bearing stones of acceptable size may be imbedded in the concrete provided they can be thoroughly incorporated in the mass and surrounded by an acceptable thickness of concrete. Such stones at the moment of placing in the concrete shall be clean, wet, and free from frost, and shall be well bedded by joggling. Projecting parts of such stones shall be cleaned and wet again, if required, before being covered with concrete. Large stones shall not be placed without first having been inspected by the Engineer.

0.91 Concrete—Samples.—Samples of both fine and coarse aggregate which the Contractor proposes to use shall be submitted to the Engineer for approval a sufficient time in advance of use to allow for the necessary tests for determining the suitability of the material for the use contemplated, and for determining the exact proportions required under the various items.

0.92 Concrete—Preparation of Foundations.—Springs encountered in the foundations shall be plugged, piped or otherwise satisfactorily disposed of. No concrete shall be placed until the foundation is prepared to the satisfaction of the Engineer. If upon rock, the surface shall be scrupulously freed from all dirt, gravel, scale, loose fragments or other objectionable substances. Streams of steam, air, or water under sufficient pressure, and wire brushes or other effective means shall be used to accomplish this cleaning. Steam jets or hot water shall be used to throughly remove snow, ice or frost if any be found upon the foundation when it is desired to lay concrete.

Earth foundations, if required, shall be thoroughly compacted by rolling or other approved methods, and in no cases shall the Contractor deposit concrete on newly placed fills or on such as, in the opinion of the Engineer, are likely to shrink or settle in a manner which may injure the concrete structure. Earth foundations shall be thoroughly and satisfactorily wetted immediately prior to placing the concrete thereon. If frozen, the soil shall be thawed out in a satisfactory manner, and then thoroughly compacted even though this may have been done previous to freezing.

0.93 Concrete—Mixing.—All operations incidental to mixing concrete shall proceed with sufficient dispatch to insure the bonding together of the successive batches as a true monolith. Concrete shall be mixed in approved mechanical batch mixers, in batches of suitable size, except that, when permitted, it may be mixed by hand in a thorough and satisfactory manner. In determining proportions

of ingredients, 100 pounds of cement shall be considered 1 cubic foot. The coarse and fine aggregates shall be measured separately, and uncompacted, in approved measuring boxes. Suitable means shall be provided for controlling and accurately measuring the water. The entire batch shall remain in the mixer not less than 60 seconds and longer if necessary to secure a thoroughly satisfactory mix. Except in special cases authorized by the Engineer, concrete which has its initial set before placing in the work shall not be retempered, but shall be at once discarded and removed.

0.94 Concrete—Forms.—The Contractor shall provide and maintain in good condition all necessary forms, molds and centers for shaping the concrete. Such forms shall be true to the required shapes and sizes, properly braced, and strong enough to withstand, without springing or warping, all operations incidental to placing the concrete. They shall be made mortar-tight, and the faces in contact with the concrete shall be satisfactorily smooth and clean. To prevent adhesion to the concrete, the contact surfaces of all forms, whether of wood or steel, shall, where required, be coated with soap, mineral oil, or other suitable substance. Wherever required, forms shall be thoroughly wet before placing concrete, so as to prevent injurious drying of the surface of the concrete. Small rods, or wires, to hold the forms in place may be imbedded in the concrete, provided proper means be used to remove the end portions within the concrete, approximately 2 inches from an exposed face. All holes left after removal of the rod or wire ends shall be immediately and completely filled with cement mortar. Forms shall not be removed until the Engineer has approved such removal, but the Contractor alone shall be responsible for all injury to concrete due to their premature removal. Forms shall be removed with great care, so as to avoid injury to the concrete. Forms unsatisfactory in any respect shall not be used, and, if condemned, shall be removed immediately from the work.

0.95 Concrete—Placing.—Provision shall be made for the rapid transportation of fresh concrete from the point of mixing to the work. Care shall be taken in conveying and depositing concrete to avoid methods which tend to produce a segregation of the component parts.

Concrete shall be deposited in approximately level layers, the thickness of which shall be no greater than will readily permit proper compacting, and such manipulation as will remove entrained air and surplus water, and produce, from the accepted materials,

the most compact, dense and impervious concrete practicable. The concrete shall be well spaded against the forms.

Concrete shall not be deposited in water without explicit permission, and then only in strict accordance with directions. Care shall be taken that no water interferes in any way with the proper placing of concrete, and the Contractor shall not allow water to rise on any concrete until, in the opinion of the Engineer, it has set sufficiently. All laitance or other substance shall be removed from the surface of concrete at such times, depending upon weather conditions and rate of hardening, as the Engineer may direct. Where new concrete is joined to old, or to rock, the surface of the old concrete or rock shall be thoroughly cleaned, using wire brushes and a jet of water from a hose if necessary, and the surface shall be clean and wet at the moment the fresh concrete is placed. If required, surfaces of concrete previously placed shall be satisfactorily roughened. A wash of neat cement grout shall be scrubbed into the contact surface of the old concrete or the rock with steel brooms immediately before placing concrete and shall be thoroughly worked into all crevices and depressions. When required, a coat of mortar shall be spread over the contact surfaces thus prepared. Provisions for bonding new concrete to old shall be made by the use of forms of such styles and dimensions as to properly form the concrete joints into steps, dovetails, grooves, or other ordered shapes. Where required large stones, dowels, or steel reinforcing rods shall be embedded in concrete for bonding new work to old.

0.96 Concrete—Construction Joints.—Wherever required the work shall be so prosecuted that construction joints will occur only at designated places, and when so directed, the Contractor shall complete by continuous depositing of concrete, sections of the work comprised between such joints.

0.97 Concrete—Contraction Joints.—Contraction joints, expansion joints, and slip-joints shall be formed where and as directed in concrete structures. In general, such joints shall be made by building smooth surfaces, acceptably coated if required with some approved substance to render them inadhesive, and shall be grooved or otherwise shaped as directed, or shall have metal strips imbedded therein.

0.98 Concrete—Finishing Surfaces.—Unless otherwise specified, all concrete surfaces which are to remain permanently exposed shall be given a neat appearance, by removing in an approved manner all rough edges and projections. Honey-combed sections

shall either be pointed up with cement mortar or taken out and the spaces refilled with concrete or mortar, as the Engineer may direct. Recesses formed by the removal of defective concrete shall be refilled with concrete as specified in Section 0.101 of the Specifications entitled Concrete—Replacing Faulty Work. Patching and plastering, or washing with cement grout, shall be done only under the specific orders and directions of the Engineer.

Exposed surfaces which are not cast against forms shall be brought to proper lines and grades and shall be given a suitable finish by means of troweling or floating.

0.99 Concrete—Cold Weather Precautions.—Concrete shall not be mixed or deposited during freezing weather without the specific direction or permission of the Engineer. When so directed or permitted, approved precautions shall be taken for removing snow, ice, or frost from the materials and from the surfaces upon which the concrete is to be placed. The water and aggregates shall be heated, and satisfactory provisions made for keeping the fresh concrete from freezing, including adequate coverings, steam pipes or other appliances and materials. Such protection of concrete shall continue, until in the opinion of the Engineer there will be no further danger from freezing. The laying of concrete may, however, be prohibited at any time when, in the judgment of the Engineer, the conditions are unsuitable or the proper precautions are not being taken.

0.100 Concrete—Protection of.—The Contractor shall not permit walking or working over or upon finished surfaces of concrete until sufficiently hardened. Concrete shall be kept moist for at least 4 weeks or until covered with earth, and during this time shall be protected from freezing. Every precaution shall be taken to prevent concrete from drying until there is no danger of cracking or crazing due to lack of moisture. To this end concrete surfaces, unless covered with wet canvas or other equally effective material, shall be sprinkled with sufficient frequency to preclude any possibility of drying out. Alternate drying and wetting shall be particularly guarded against. Great care shall be exercised at all times to prevent injury to concrete surfaces which will be exposed in the finished work. The Contractor may at any time prior to the final acceptance of the work be required to clean all exposed faces of concrete.

0.101 Concrete—Replacing Faulty Work.—If, upon removing the forms, molds, or centers, any voids or other imperfections be

found, such faults shall be corrected by the Contractor without additional cost to the District, by patching or other methods, as directed, even to the extent of taking down and replacing unsatisfactory concrete; or if any forms shall fail or become displaced, and as a result the section of concrete contained therein shall, in the opinion of the Engineer, be injured or out of line or be subjected to premature stresses, the Contractor, without additional cost to the District, shall satisfactorily replace so much of said section of concrete as the Engineer may deem necessary, even to the extent of rebuilding the entire section.

The Contractor shall have no claim for payment for cement used in concrete which is rejected as faulty or unsatisfactory.

0.102 Concrete—Placing Metal Work.—There shall be embedded in, or set in, or attached to the concrete wherever directed, reinforcing steel, structural steel shapes, castings, piping or other metal objects shown on the Drawings, required by these Specifications or ordered. The concrete shall be packed tightly around metal work to prevent leakage, and to secure perfect adhesion, and all necessary precautions shall be taken to prevent these objects from being loosened, displaced, broken or deformed.

0.103 Concrete—Measurement for Payment.—The quantities of concrete to be paid for shall be the number of cubic yards deposited in place in accordance with the Drawings, Specifications, and instructions of the Engineer. Whenever the structures are of such types that concrete is to be built against the sides of any excavation, the concrete shall be measured as if the excavation were made exactly to the prescribed lines. Any rubble or brick masonry used by permission of the Engineer for convenience in setting pipes or other objects, or for other purposes in connection with concrete structures, and any mortar used with approval in the laying of any such masonry, shall be measured and paid for as of the class of concrete in which it is used.

0.104 Concrete—Prices to Include.—Except for cement, reinforcing steel and other metal work, as provided elsewhere, the unit prices for the different items of concrete shall cover the entire cost of construction thereof, which shall include: the cost of materials for fine and coarse aggregates, and of large stones; the cost of all mixing, conveying, placing of concrete and large stones; the cost of damming, bulkheading, pumping, bailing; the cost of preparing foundations, piping or otherwise caring for water, and removing laitance; the cost of grout wash or mortar beds used in building

upon old work or on rock, and of coatings for contraction joints; the cost of protecting concrete against frost, floods and injury from other sources; the cost of erecting and removing forms, centers, molds, bracing, landing platforms and scaffolds, and of the lumber, steel, nails, wire and other material used therein; the cost of finishing, patching, and wetting; the cost of removing and replacing defective work; and any other work and materials necessary to complete the concrete construction as required by this Contract.

But such unit prices shall not include the cost of furnishing cement, the cost of furnishing and placing reinforcing steel, piping, conduits, structural steel, castings and other metal work, which shall be paid for under the items provided therefor.

0.105 **Mortar.**—Mortar shall consist of Portland cement, fine aggregates and water, mixed in such proportions as the Engineer may direct. The cement, fine aggregates and water shall conform to the specifications for these materials for concrete, except that the fine aggregate in mortar used for filling joints of pipes or brick masonry shall have no grains larger than will pass a ⅛-inch mesh screen.

Payment for mortar will not be made separately, but will be included in the unit price of the concrete, masonry, pipe, or other work in which it is used; except that the cement will be paid for as a separate item.

DETAIL SPECIFICATIONS

Item 1

Stream Control at Dams

1.1 **Description.**—Under this item shall be included all work and material and all uses of the resources of the Contractor which may be necessary in order to adapt the work of constructing the dams and appurtenances to the safe control of the flow of the stream during construction, and until the entire work of constructing the dams and appurtenances is fully completed; the object being to secure the safety of life and property below the dams, and to prevent damage or delay of completion which might result from inadequate steps being taken under this item.

1.2 **Methods and Equipment.**—The Contractor shall prepare his own plans and methods for carrying out the requirements of this item, and shall be responsible for the effectiveness of such plans and methods. Such plans and methods shall be submitted to the Engineer for his approval; but such approval shall cover only the right of the Contractor to proceed with the work. The Contractor shall have no claim or charge against the District because of any unforeseen expense in building or rebuilding work resulting from the necessities or results of stream control operations.

1.3 **Payment.**—The payment under this item, not included in the five cases specified below, shall be a lump sum specified for this item in the Agreement.

First. Riprap, where ordered or approved, shall be paid for under Item 58, Riprap.

Second. Removing ordered or approved riprap within the limits of the dam, and excavating slope of embankment to make satisfactory bond between old and new work, shall be paid for under Items 6, and 6a, Excavation, provided that should the slopes become steeper than is permitted, due to undercutting or erosion in any form, the sides of a stream-control gap shall be excavated to the required slope at the Contractor's expense.

Third. Preparing the stream bed for embankment shall be paid for under Item 2, Clearing and Grubbing, or Item 5, Soil Stripping, or both, except that removal of ordered riprap will be paid for as provided in the preceding paragraph.

Fourth. Embankment, within the limits of the dam, shall be paid for under Item 31, 32, or 33, as may be appropriate, provided that should the embankment forming the sides of a stream-control gap be washed out or damaged by undercutting or other causes to such an extent that removal is necessary as determined by the Engineer, such embankment shall be replaced at the Contractor's expense.

Fifth. Excavation in inlet, or outlet, or channel, of a stream-control gap, where ordered, shall be paid for under Items 6, 7, 8, 6a, 7a, and 8a, Excavation, according to the class of material excavated.

The lump sum stipulated for Item 1 shall be paid when the dam is built to its full height, and when, in the opinion of the Engineer, no further work under this item will be required. It shall be considered full compensation for all services, labor, material and equipment, and for all the resources of the Contractor used for, or incidental to, the operations under this item; and for all risks and damages connected therewith.

In case any of the material placed or work done in connection with stream control, or affected thereby, sha'l be washed out or damaged at any time before the completion of the Contract, it shall be replaced or made good by the Contractor without additional expense to the District.

Item 2

Clearing and Grubbing

2.1 **Description.**—Such portions of the sites of embankments, highway rights-of-way, borrow pits, excavations to be used for embankment material, and other areas, as the Engineer may designate, shall be cleared of all trees, stumps, bushes, and other similar encumbrances. Roots, one inch or more in diameter, shall be grubbed as directed.

2.2 **Disposal of Materials.**—Materials obtained from the clearing and grubbing operations, shall be the property of the Contractor unless otherwise specified, and must be removed from the vicinity of the work or otherwise satisfactorily disposed of.

2.3 **Payment.**—The quantity to be paid for under this item shall be the area in acres prescribed or designated by the Engineer, within the limits of the work, from which all encumbrances as herein provided shall have been satisfactorily removed. In the case of isolated trees the area to be paid for shall be that covered by the over-

hang of the branches. Should any growth occur between the time of clearing and the time of placing of embankment, the Contractor shall satisfactorily remove such growth, but payment shall be made once only for any given area, regardless of how many times it may be found necessary to go over such area to render its condition satisfactory at the time of use. The unit price stipulated for this item shall include the cost of clearing the area of all encumbrances as specified, of disposing of all materials, and all expense incidental thereto, except as hereinbefore provided under Section 0.62 of the Specifications, entitled Materials Obtained from Construction.

Item 3

Removal of Buildings

3.1 Description.—Buildings or other similar structures encumbering the site of the work, including all concrete or masonry within the foundation, and fences, shall be removed as directed, and the ground occupied by them or affected by their construction or removal shall be left in proper condition for the building thereon of embankments or for any other use for which it may be needed.

3.2 Disposal of Materials.—Materials obtained from the removal of structures, under this item, shall be the property of the Contractor unless otherwise specified, and must be removed from the vicinity of the work or otherwise satisfactorily disposed of.

3.3 Payment.—The lump sum price to be paid for this item shall include the cost of clearing the area designated of all encumbrances as specified, of disposing of all materials, and all expense incidental thereto, except as hereinbefore provided under Section 0.62 of the Specifications, entitled Materials Obtained from Construction.

Item 4

Trimming and Shaping Slopes of River Channels

4.1 Description.—This item shall include the performance of such work, in addition to the channel excavation, as may be necessary to give the channel slope or bank a true shape conforming to the lines and grades shown on the Drawings or given by the Engineer. All irregularities shall be corrected, and the surface left even and smooth without projections. Wherever revetment is

specified, the surface here described shall mean the sub-grade. Wherever surface dressing and grassing is required the sub-grade shall be trimmed as herein specified immediately before the placing of the top soil.

The channel excavation at the slopes shall be so made that the natural ground shall not be disturbed back of the line of finished slope, or the line of sub-grade in case revetment or top soil is required.

4.2 **Payment.**—The quantity to be paid for under this item shall be the area in square yards, included within the limits shown on the Drawings or designated by the Engineer. The price stipulated for this item shall include the cost of all operations and materials necessary for the trimming and shaping of the slopes, and the disposal of surplus materials, and all expense incidental thereto, except as provided in Section 0.62 of the Specifications, entitled Materials Obtained from Construction.

Item 5

Excavation, Soil Stripping

5.1 **Description.**—Soil stripping shall include the excavation within the area to be covered by embankment, of all top soil, peat, grass, weeds, muck, boulders, loose rock, perishable or otherwise objectionable matter, to such depths as may be ordered, in order that the earth embankment may be suitably bonded to a satisfactory natural foundation. Where such material overlies material to be excavated, stripping shall not be estimated for payment as a separate item, but the surface material shall be measured with the excavation directly underlying.

No payment shall be made for the stripping of borrow pits, but the cost of such stripping shall be included as a part of the contract price for furnishing and placing the other material taken from the borrow pit.

5.2 **Payment.**—Measurement for payment under this item shall include the quantity of material in cubic yards, measured in excavation, actually removed from within the limits shown on the Drawings or prescribed by the Engineer. The price bid shall include the cost of all operations and materials incidental to the excavation and disposal of the materials excavated, except as hereinbefore provided under Section 0.62 of the Specifications entitled Materials Obtained from Construction.

Items 6, 7, 8, 6a, 7a, and 8a

Excavation for New Channels in Channel Improvements, for Cut-off Trenches and for Stream Control Channels

6.1 7.1 8.1 6a.1 7a.1 8a.1 **Description.**—These items shall include all excavation for new channels in channel improvements; for cut-off trenches at embankments; and for stream control channels; classified as described in Section 0.65 of the Specifications entitled Excavation—Classification.

Item 6 shall include such excavation that may be classified properly as Class 1—Earth.

Item 7 shall include such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 8 shall include such excavation that may be classified properly as Class 3—Rock.

In some cases there has been shown and so designated on the Drawings, the estimated elevation of mean low water at points where the excavations listed above are to be made. In such cases, and only in such cases, Items 6a, 7a, and 8a shall include the excavation, below such estimated elevation, that may properly be classified, respectively, as Class 1—Earth; Class 2—Mixed Excavation; and Class 3—Rock. Where no such estimated elevation is shown on the Drawings all excavation whether above or below mean low water, will be included under Items 6, 7, and 8, and not under Items 6a, 7a, or 8a.

Excavations shall have such side slopes as are shown on the Drawings or designated by the Engineer.

6.2 7.2 8.2 6a.2 7a.2 8a.2 **Maintenance During Construction.**—Should material wash into a cut-off trench before the placing of embankment, or stony gullies due to wash be formed, such material and stones shall be carefully removed, if directed, and the Contractor shall be paid the contract price per cubic yard for material so removed.

The excavations for channel improvements and for stream control channels shall be maintained in good order by the Contractor at his own expense, and if such maintenance involves the removal of material from outside the prescribed limits, no payment shall be made the Contractor for the handling of such outside material.

6.3 7.3 8.3 6a.3 7a.3 8a.3 **Payment.**—Payment for these items will be made in accordance with Section 0.71, of the Specifications, entitled Excavation—Payment, except that in cases of excavation for Channel Improvement, where it is not practicable to measure the material in excavation, the quantities may be determined from spoil banks or embankments in which the material has been placed, making deduction of 5 per cent for shrinkage.

Items 9, 10, and 11

Excavation for River Channel Improvements

9.1 10.1 11.1 **Description.**—These items shall include all river channel excavation for channel improvements (except excavation for new channels, and for structures as provided for elsewhere) classified as described in Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 9 shall include all such excavation that may be classified properly as Class 1—Earth.

Item 10 shall include all such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 11 shall include all such excavation that may be classified properly as Class 3—Rock.

Excavation under Items 9, 10, or 11, will be classified without regard to its location above or below the elevation of mean low water.

Finished work shall present a reasonably smooth and uniform surface, and shall nowhere project above grade or within the limits of the prescribed section.

9.2 10.2 11.2 **Payment.**—Payment for these items will be made in accordance with Section 0.71 of the Specifications, entitled Excavation—Payment, with the following exceptions:

This material will be measured in the spoil banks or the embankments in which it is placed, with a deduction of 5 per cent for shrinkage, as it is not practicable to measure it in excavation. Deduction will be made for material excavated more than 0.3 foot below grade or more than 0.3 foot beyond prescribed limits.

Any material that washes into the cut through no fault of the Contractor shall be removed by him at the unit price per yard stipulated for these items.

Required haul beyond the limit of free haul will be paid for under Item 12, Excavation—Overhaul for River Channel Improvements.

Item 12

Excavation—Overhaul for River Channel Improvements

12.1 Description.—This item shall include the transporting beyond the limit of free haul, which will be 2000 linear feet unless otherwise specified, of material excavated for river channel improvements,—under Items 9, 10, or 11 only,—and deposited in spoil banks, embankments, or other places. It shall not include the transporting of any material except under the Engineer's specific orders.

12.2 Payment.—The overhaul to be paid for under this item shall be the quantity in cubic yards per 100 feet transported beyond the free haul limit. The length of haul shall be understood to mean the distance from the center of mass of the material in place before excavation to the center of mass of the same material as deposited; the locations of either center of mass will be estimated from the best data available, when determinations by actual measurement are not practicable.

Items 13, 14, 15, 13a, 14a, and 15a

Excavation for Outlet Works and Spillways at Dams

13.1
14.1
15.1
13a.1
14a.1
15a.1 **Description.**—These items shall include all excavations for outlet works and spillways at Dams, including approach and discharge channels, classified as described in Section 0.65 of the Specifications, entitled Excavation —Classification.

Item 13 shall include such excavation that may be classified properly as Class 1—Earth.

Item 14 shall include such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 15 shall include such excavation that may be classified properly as Class 3—Rock.

In some cases there has been shown and so designated on the Drawings, the estimated elevation of mean low water at points where these excavations are to be made. In such cases, and only in such cases, Items 13a, 14a, and 15a, shall include the excavation, below such estimated elevation, that may properly be classified, respectively, as Class 1—Earth; Class 2—Mixed Excavation; and Class 3—Rock. Where no such estimated elevation is shown on the Drawings, all excavations whether above or below mean low water will be included under Items 13, 14, and 15, and **not** under Items 13a, 14a, or 15a.

13.2 **Sheeting and Bracing.**—Satisfactory sheeting and
14.2 bracing shall be used, unless omitted by written permis-
15.2 sion of the Engineer, to hold the sides of the excavation
13a.2 for the outlet conduits, and to prevent damage from
14a.2 seepage into the cut. All sheeting and bracing shall be
15a.2 removed as the backfill is placed, unless otherwise ordered in writing by the Engineer. The trench shall at all times be kept satisfactorily unwatered in accordance with Section 0.59 of the Specifications, entitled Pumps and Drains, except that after the excavation is completed and while concrete is being laid the unwatering of excavation shall be considered as part of the work required under Concrete, Items 41a and 43a.

13.3 **Payment.**—Payment for these items shall be made in
14.3 accordance with Section 0.71 of the Specifications, en-
15.3 titled Excavation—Payment.
13a.3
14a.3
15a.3

Items 16, 17, and 18

Excavation for Minor Drainage Systems

16.1 **Description.**—These items shall include all excavation
17.1 in connection with the minor surface drainage systems
18.1 such as are used for disposing of springs in embankment foundations, or for draining low sections of land within the retarding basins, or for handling surface water on the berms of embankments, or for similar purposes; classified in accordance with Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 16 shall include all such excavation that may be classified properly as Class 1—Earth.

Item 17 shall include all such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 18 shall include all such excavation that may be classified properly as Class 3—Rock.

16.2 **Payment.**—Payment for these items will be made in
17.2 accordance with Section 0.71 of the Specifications, en-
18.2 titled Excavation—Payment.

Items 19, 20, and 21

Excavation for Street and Highway Cuts and Fills

19.1 20.1 21.1 **Description.**—These items shall include the excavation of material from street and highway cuts, and from borrow pits, trenches for culverts, ditches, drains, and from other points as required for street and highway construction or alteration, not including bridge piers and abutments; the placing of such material in the highway fill as directed; and the excavation and removal of such material as is unsuitable for road foundations. The materials excavated under these items which are suitable shall be used in the construction to the extent required, but payment will be made only for the original removal.

This excavation shall be classified in accordance with Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 19 shall include all such excavation that may be classified properly as Class 1—Earth.

Item 20 shall include all such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 21 shall include all such excavation that may be classified properly as Class 3—Rock.

19.2 20.2 21.2 **Disposal of Material.**—All suitable material from the excavation shall be used as far as practicable to build embankments and to make refills in excavations. Surplus excavation and waste material shall be used to widen embankments or shall be deposited in such places and in such manner as may be suitable.

19.3 20.3 21.3 **Borrow Pits.**—Wherever the material from the excavation suitable for use is insufficient in quantity to form the necessary embankments and refills, the Engineer will designate where additional Class 1 material may be procured. Unless otherwise directed by the Engineer a berm of at least four feet shall be left between the outside of the embankment and the edge of a borrow pit, with provision for side slopes of 1½ to 1 to the bottom of the borrow pit. Unless the Engineer gives the Contractor specific written orders to excavate material other than earth from borrow pits, all material obtained from borrow pits will be paid for under Item 19, as earth excavation, regardless of its actual character.

19.4 20.4 21.4 **Construction of Embankments and Refills.**—The materials used in street and highway embankments and refills shall be free from all matter which is perishable or of a nature to cause unduly prolonged settlement. Embankments shall be constructed to conform to the lines and grades shown on the Drawings or prescribed by the Engineer, and such overfill, not to exceed 10 per cent, shall be placed as may be required by the Engineer to allow for settlement. Where directed by the Engineer embankments shall be built in horizontal layers approximately five feet in thickness, each layer being built to the full width. Backfilling around culverts, bridge abutments or other structures shall be thoroughly compacted by puddling, tamping or other approved methods as directed.

19.5 20.5 21.5 **Maintenance During Construction.**—The Contractor shall keep the surface of the roads constructed under this Contract in good condition, during the life of the Contract. When so ordered, he shall fill any depressions caused by settlement or by wear and tear due to use, and he shall be paid therefor at the unit prices stipulated for the respective items entering into such repairs.

19.6 20.6 21.6 **Readjusting Grades.**—Attention is called to the uncertainty of ledge rock elevations, which, owing to the nature of the work to be done, cannot be determined in advance. In order to avoid shallow rock excavation, or to obtain sufficient suitable materials for embankments and refills, or for any other purposes, the grades shown on the Drawings may be changed or modified at any time by the Engineer, to obtain the desired results.

19.7 20.7 21.7 **Payment.**—Unless otherwise shown on the Drawings or specifically ordered by the Engineer, work under these items shall be paid for in accordance with Section 0.71 of the Specifications, entitled Excavation—Payment, and as follows:

First. Clearing and Grubbing will be paid for under Item 2.

Second. All excavations in which concrete structures are to be constructed will be measured for payment to lines 1 foot outside of the foundations of the structure and to such slopes as will stand without sliding; provided that when the character of the material cut into is such that it can be trimmed to the required lines of the structure, and the concrete placed against the sides of the excavation without the use of intervening forms, payment will not be made for excavation outside of the required limits of the concrete.

Third. All excavations for culverts or drains in which circular pipes are to be placed, shall be measured for payment to the required elevation of the lowest part of the pipe, to a bottom width 2 feet greater than the nominal diameter of the pipe and to such side slopes as will stand without sliding.

Fourth. All excavation not included in the two preceding paragraphs shall be measured for payment as excavation in place before removal, to include the total amount of excavation required for embankments and refills as well as that which by the direction of the Engineer is excavated and wasted.

Fifth. Backfilling will be paid for under Item 37.

With the exceptions noted above the unit prices stipulated under these items shall include the cost of all labor and materials, and all other expense necessary for completing the excavation, hauling it as far as is necessary, and properly placing and depositing it in the embankments and refills, or otherwise disposing of it in a satisfactory manner.

Items 22, 23, 24, 22a, 23a, and 24a

Excavation for Retaining Walls, Bridge Piers, and Flood Gate Structures, except at Dams

22.1
23.1
24.1
22a.1
23a.1
24a.1

Description.—These items shall include all excavations for retaining walls, bridge piers and abutments, flood gate structures and similar structures except at Dams, where such excavation will be included in that for outlet works and spillways. The excavation will be classified in accordance with Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 22 shall include such excavation that may be classified properly as Class 1—Earth.

Item 23 shall include such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 24 shall include such excavation that may be classified properly as Class 3—Rock.

In some cases there has been shown and so designated on the Drawings, the estimated elevation of mean low water at points where these excavations are to be made. In such cases, and only in such cases, Items 22a, 23a, and 24a shall include the excavation, below such estimated elevation, that may properly be classified, re-

spectively, as Class 1—Earth; Class 2—Mixed Excavation; and Class 3—Rock. Where no such estimated elevation is shown on the Drawings, all excavations, whether above or below mean low water, will be included under Items 22, 23, and 24, and not under Items 22a, 23a, or 24a.

22.2 23.2 24.2 22a.2 23a.2 24a.2 **Sheeting and Bracing.**—Satisfactory sheeting and bracing shall be used, unless omitted by written permission of the Engineer, to hold the sides of the excavation and to prevent damage from seepage into the cut. All sheeting and bracing shall be removed as the backfill is placed, unless otherwise ordered in writing by the Engineer. The excavation shall at all times be kept satisfactorily unwatered in accordance with Section 0.59 of the Specifications, entitled Pumps and Drains. All voids left or caused by withdrawal of sheeting shall be filled immediately with suitable material, and tamped or puddled as required.

22.3 23.3 24.3 Payment.—Payment for these items will be made in accordance with Section 0.71 of the Specifications, entitled Excavation—Payment.

22a.3 23a.3 24a.3 Unless otherwise shown or prescribed the excavations will be measured to vertical planes 1 foot outside of the required limits of the foundation of the structure.

Items 25, 26, and 27; 25a, 26a, and 27a

Excavation and Backfilling of Trenches, Except at Dams

25.1 26.1 27.1 25a.1 26a.1 27a.1 **Description.**—These items shall include all excavation and backfilling of trenches for pipes, sewers, conduits, levee culverts and similar structures, except at Dams, where such excavation is included in the items for Excavation for Minor Surface Drainage Systems; and except in connection with highway construction in which case it is included in the items for Street and Highway Cuts and Fills. This excavation shall be classified as provided in Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 25 shall include such excavation that may be classified properly as Class 1—Earth.

Item 26 shall include such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 27 shall include such excavation that may be classified properly as Class 3—Rock.

In some cases there has been shown and so designated on the Drawings, the estimated elevation of mean low water at points where these excavations are to be made. In such cases, and only in such cases, Items 25a, 26a, and 27a shall include the excavation, below such estimated elevation, that may properly be classified, respectively, as Class 1—Earth; Class 2—Mixed Excavation; and Class 3—Rock. Where no such estimated elevation is shown on the Drawings, all excavation whether above or below mean low water will be included under Items 25, 26, and 27, and not under Items 25a, 26a, or 27a.

All excavation shall be made in open cut, and no tunneling will be allowed except by written permission or order from the Engineer.

25.2 26.2 27.2 25a.2 26a.2 27a.2 **Sheeting and Bracing.**—Satisfactory sheeting and bracing shall be used, unless omitted by written permission of the Engineer, to prevent any movement which would injure the new or existing structures, and to prevent damage from seepage into the trench. Where used it shall be kept driven ahead of the excavation whenever practicable. If, in the opinion of the Engineer, additional bracing is required, it shall be placed under his orders at the expense of the Contractor. All sheeting and bracing shall be removed as the backfill is placed, unless otherwise ordered in writing by the Engineer. The excavation shall be kept satisfactorily unwatered in accordance with Section 0.59 of the Specifications, entitled Pumps and Drains. All voids left or caused by withdrawal of sheeting shall be filled immediately with suitable material, tamped or puddled as required.

25.3 26.3 27.3 25a.3 26a.3 27a.3 **Payment.**—Payment for these items shall be made in accordance with Section 0.71 of the Specifications, entitled Excavation—Payment. Unless otherwise shown or prescribed the width of trench will be measured as 2 feet greater than the nominal diameter of the pipe to be laid therein, or as 2 feet more than the base width of the concrete or masonry sewer or structure; the sides of the trench will be considered as being vertical; the depth and length shall be the required depth and length of the structure. The unit prices stipulated for these items shall also include the cost of backfilling the trenches as prescribed in Sections 0.83 and 0.84 of the Specifications, entitled Backfilling.

Items 28, 29, and 30

Excavation, Miscellaneous

28.1 29.1 30.1 **Description.**—These items shall include all excavation of whatever nature, shown on the Drawings or ordered by the Engineer, not included in Items 1 to 27 inclusive, classified in accordance with Section 0.65 of the Specifications, entitled Excavation—Classification.

Item 28 shall include all such excavation that may be classified properly as Class 1—Earth.

Item 29 shall include all such excavation that may be classified properly as Class 2—Mixed Excavation.

Item 30 shall include all such excavation that may be classified properly as Class 3—Rock.

28.2 29.2 30.2 **Payment.**—Payment for these items will be made in accordance with Section 0.71 of the Specifications, entitled Excavation—Payment.

Items 31, 32, and 33

Embankment for Main Dams

31.1 32.1 33.1 **Description.**—These items shall include all embankments for main dams as shown on the Drawings or required by the Engineer.

Item 31 shall include all such embankment that may be classified properly as Class A Embankment, as described in Section 0.73 of the Specifications.

Item 32 shall include all such embankment that may be classified properly as Class B Embankment, as described in Section 0.74 of the Specifications.

Item 33 shall include all such embankment that may be classified properly as Class C Embankment as described in Section 0.75 of the Specifications.

Bids on any or each of these classes of embankment may be submitted, and the choice of the methods of construction on which proposals are received, will be made after consideration of the bids, together with the relative merits of the methods.

31.2 32.2 33.2 **Allowance for Shrinkage and Settlement.**—Sufficient overfill shall be placed to provide for shrinkage and settlement. To this end, the top and the slopes of the dam shall be built to lines determined by adding not more

than one per cent to the net vertical depth of fill required at any point. In calculating shrinkage and settlement at the time of trimming and dressing the surface, it will be considered that shrinkage will continue at a uniform rate for one year after the completion of the fill to any given elevation. At the time of trimming, the required excess to provide for shrinkage at any given point shall be varied according to the age of the fill so that no excess will be required on a fill which has been in place for one year.

While slight depressions on the slopes may be made to conform to the required lines by subsequent filling, such procedure is not looked upon with favor, and the Contractor shall carefully conduct his operations in such manner that the material originally placed shall conform approximately to the limits prescribed. Any loss of section by displacements, slides or slips, either inward or outward, which may occur before final acceptance of the work, shall be satisfactorily corrected by the Contractor, without expense to the District.

31.3 32.3 33.3 **Trimming Slopes.**—As the last work to be done under these items, the Contractor shall carefully trim the slopes and top of the embankment to the required gross lines, and depressions, if any, shall be brought to grade with acceptable material satisfactorily compacted. If required, the slopes shall then be dressed with top soil of the thickness prescribed, and grassed, as provided under Item 38, Surface Dressing and Grassing. In case excess material has been placed in the fill, the Contractor will not be required to remove it, except in so far as is necessary to leave the berms in good condition, to leave the slopes and surface uniform, and to prevent interference or lack of conformity with conduits, spillways, or other parts of the work.

31.4 32.4 33.4 **Payment.**—Payment under these items will be made in accordance with Section 0.82 of the Specifications, entitled Embankment—Payment.

Items 34 and 35

Embankment for Levees

34.1 35.1 **Description.**—These items shall include all embankments for levees as shown on the Drawings or required by the Engineer.

Item 34 shall include all such embankment that may be classified properly as Class D Embankment, as described in Section 0.76 of the Specifications.

Item 35 shall include all such embankment that may be classified properly as Class E Embankment, as described in Section 0.77 of the Specifications.

34.2 35.2 **Allowance for Shrinkage and Settlement.**—Sufficient overfill shall be placed to provide for shrinkage and settlement, depending upon the character of materials used as well as the manner of placing. In no case, however, will the overfill required on this account exceed 10 per cent. Any loss of section by displacements, slides or slips, which may occur before final acceptance of the work, shall be satisfactorily replaced by the Contractor, without expense to the District.

34.3 35.3 **Trimming Slopes.**—Before the completion of the work under these items the Contractor shall trim the slopes and top of the embankment to the required lines and grades, in a workmanlike manner. If required, the slopes shall then be dressed with top soil of the thickness prescribed, and grassed, as provided under Item 38, Surface Dressing and Grassing. In case excess material has been placed in the fill, the Contractor will not be required to remove it, except in so far as is necessary to leave the berms in good condition and to leave the slopes and surface uniform.

34.4 35.4 **Payment.**—Payment under these items will be made in accordance with Section 0.82 of the Specifications, entitled Embankment—Payment, except that the unit prices, under Item 34, Embankment Class D, shall not include the cost of excavation, which will be included for payment under other items. Under Item 35, however, the unit prices shall include the cost of excavation from borrow pits.

Item 36

Embankment, Miscellaneous

36.1 Description.—This item shall include all embankments as shown on the Drawings or required by the Engineer, that may be classified properly as Class F Embankment as described in Section 0.78 of the Specifications.

36.2 Allowance for Shrinkage and Settlement.—Sufficient overfill not exceeding 15 per cent shall be placed to allow for settlement, depending upon the character of materials used and the manner of placing.

36.3 Payment.—Payment under this item will be made in accordance with Section 0.82 of the Specifications, entitled Embankment—Payment.

Item 37

Backfilling

37.1 Description.—Backfilling shall be in accordance with Sections 0.83 and 0.84 of the Specifications. This item shall include only such backfilling as is specified in the Estimates or Drawings as a separate item, or as may be ordered as a separate item by the Engineer.

37.2 Payment.—The backfilling to be paid for under this item shall include the quantity, in cubic yards, measured or estimated in place, between the outside neat lines of the structure and the prescribed lines for payment for excavation, or as shown on the Drawings or designated by the Engineer. The unit prices stipulated for backfilling under this item shall include the cost of selecting, placing, and compacting the material; of obtaining material from borrow pits, if necessary, and hauling it to the site; of furnishing and using water for sprinkling, wetting or puddling, of protecting pipes, conduits and other structures or property; and of all work or material incidental to placing the backfilling and leaving it in a satisfactory condition at the completion of the Contract.

Item 38

Surface Dressing and Grassing

38.1 Description.—The surface of embankments, refills, exposed slopes of excavations, borrow pits, spoil banks, concrete surfaces, and any other exposed surfaces, wherever directed, shall be dressed with top soil of the thickness prescribed, and grassed. In general, top soil shall be not less than 6 inches, nor more than 24 inches, in thickness.

38.2 Materials.—Surface dressing shall consist of fertile loam soil, unless the use of clay mixed with fertilizer is permitted by the Engineer. Suitable materials obtained from the excavations and stripping operations may be used for surface dressing under the provisions of Section 0.62 of the Specifications, entitled Materials Obtained from Construction, and any additional top soil that may be required may be obtained from points designated by the Engineer.

The seed shall be first quality grass seed of a suitable mixture for the purpose; and if required, suitable seed for a nurse crop also shall be provided.

38.3 **Methods.**—The surface soil shall be brought into good condition for a seed bed before the seed is sown. It shall be sown with the quantity and kind of seed prescribed. If in the interval between placing the top soil and sowing, weeds shall grow on the surface to be grassed, the Contractor shall remove the weeds without additional compensation. Any sloughing or washing of the top soil which may occur shall be made good, and any portions of the seeded area which are not thoroughly covered with grass shall be reprepared and reseeded, without additional cost to the District, to the end that all surfaces prepared under this item shall have a satisfactory smooth covering of top soil and grass at the termination of this Contract.

38.4 **Payment.**—The surface dressing and grassing to be paid for under this item shall include the quantity of soil, in cubic yards, measured in place, actually deposited and satisfactorily grassed in accordance with the Drawings or as required by the Engineer. The unit price stipulated under this item shall include the obtaining, transporting, and placing of soil, the fertilizing and seeding, and all labor and materials incidental to securing a satisfactory stand of grass. If material excavated in stripping the foundation for embankment, or in other prescribed excavations, is used for dressing, it will be paid for both as excavation and as surface dressing.

Note—There are no Items 39 or 40.

Items 41 and 41a

Concrete in Outlet Works, Spillways, Retaining Walls, Bridge Piers, and Similar Structures

41.1 **Description.**—These items shall include concrete
41a.1 requiring accurately shaped forms, in outlet works, spillways, retaining walls, bridge piers, and similar structures, in which may or may not be imbedded steel reinforcement or other metal work; it may be proportioned by volume from about 1 of cement, 2 of sand, and 4 of coarse aggregate, to about 1 of cement, 3 of sand and 6 of coarse aggregate, as the Engineer may direct. These items shall not include concrete in the lining of conduits, which is covered by Item 42, or that in floors or aprons of outlet works, spillways, etc., which is covered by Items 43 and 43a.

Under Item 41a will be included all concrete requiring accurately shaped forms, in outlet works, spillways, retaining walls and similar structures, placed below the plane of estimated mean low water shown and so designated in the Drawings. Provided, however, that whenever for any structure no such plane is indicated in the Drawings, all concrete, whether above or below mean low water level, will be included under Item 41 and not under Item 41a.

41.2 41a.2 **Payment.**—Payment under these items shall be made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Item 42

Concrete in Conduit Linings at Dams

42.1 Description.—The lining of the outlet conduits, except as otherwise indicated in the Drawings, shall consist of a special grade of concrete, mixed in proportions by volume, of approximately 1 of cement, 1½ of sand, and 2½ of coarse aggregate, the latter to be composed of fragments of granite, trap, or other suitable igneous rock approved by the Engineer. Such coarse aggregate shall pass through a screen having 1-inch round holes, and be retained on a ¼-inch mesh screen. No large stones shall be placed in this class of concrete. As maximum possible density and exceptionally smooth and uniform interior surfaces are essential for the conduit linings, more than ordinary care shall be exercised in building, finishing and securing forms, and in proportioning, mixing and placing the concrete, and the Contractor shall employ none but skilled labor for this work. Both the fine and the coarse aggregates shall be especially well graded. To secure the proper gradation it may be necessary to separate the coarse aggregate into not more than three sizes, and thoroughly remix in such proportions as directed. After placing in the forms, the concrete shall be so manipulated by spading and joggling as to expel entrained air, not only from the concrete, but also from between the face of concrete and the forms. No plastering or patching of concrete surfaces forming the waterway shall be done unless expressly permitted, and if so permitted, shall be done in strict accordance with directions. No thin patching or plastering will be permitted, but recesses shall be cut of such shape as to retain the patches, and of such depth as to insure their permanency. If required, anchor bolts shall be set in drilled holes, and these and wire mesh or other suitable device embedded in the

patch. The Contractor shall supply carborundum brick or emery wheels, if necessary, and shall dress all inequalities on the surface of this concrete.

42.2 **Payment.**—Payments under this item shall be made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Items 43 and 43a

Concrete in Aprons, Paving at Dams and Similar Flat Shapes

43.1 **Description.**—These items shall include concrete in
43a.1 aprons, floors, paving at dams, and similar flat shapes requiring either no forms at all, or in places, crude or inexpensive forms only, and whether or not containing reinforcing steel. It may be proportioned by volume from about 1 of cement. 2 of sand and 4 of coarse aggregate, to about 1 of cement, 2½ of sand and 5 of coarse aggregate, as the Engineer may direct.

Under Item 43a will be included all concrete in aprons, paving at dams, and similar flat shapes placed below the plane of estimated mean low water shown and so designated in the Drawings. Provided, however, that whenever, for any structure no such plane is indicated in the Drawings, all concrete, whether above or below mean low water level, will be included under Item 43, and not under Item 43a.

43.2 **Payment.**—Payment under these items shall be
43a.2 made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Items 44 and 44a

Concrete in Monolithic Slope Revetment

44.1 **Description.**—These items shall include concrete in
44a.1 monolithic slope revetment on river banks, and in concrete footing walls and copings bordering revetment, which may contain steel reinforcement. It may be proportioned by volume, from about 1 of cement, 2 of sand and 4 of coarse aggregate, to about 1 of cement, 2½ of sand and 5 of coarse aggregate, as the Engineer may direct. The Contractor shall dress all surfaces of embankments on which concrete revetment is to be placed, to true planes and to the slopes shown in the Drawings, and the Speci-

fications relating to preparation of foundations shall govern the operations of the Contractor prior to placing concrete. Concrete shall be deposited behind forms and in panels extending up and down the embankment, but in pouring, concrete shall not be permitted to flow down the embankment except through chutes. The lagging composing the face forms shall be securely fastened, to the approval of the Engineer, and shall be laid parallel with the direction of flow of the stream.

Under Item 44a will be included all concrete in monolithic slope revetment placed below the plane of estimated mean low water shown and so designated in the Drawings. Provided, however, that whenever, for any structure no such plane is indicated in the Drawings, all concrete, whether above or below mean low water level, will be included under Item 44, and not under Item 44a.

44.2 44a.2 Payment.—Payment under these items shall be made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Item 45

Concrete in Flexible Slab Revetment or Channel Lining

45.1 Description.—Concrete slabs for flexible slope revetment or channel lining, shall be cast in approved molds (which shall not be loosened in less than 48 hours, nor entirely removed until directed), in a place affording ample storage facilities, and unless otherwise directed, shall be aged for not less than 28 days before being placed in the work. The concrete will contain reinforcing steel or other metal and may be proportioned, by volume, from about 1 of cement, 2 of sand and 3 of coarse aggregate, to about 1 of cement, 2½ of sand and 5 of coarse aggregate, as the Engineer may direct. The maximum size of the coarse aggregate shall be such as will pass through a screen having 2-inch round holes. Steam curing may be resorted to, provided the process and appliances shall be satisfactory. The time required for curing by such steaming process will be determined by the Engineer from actual tests.

The slabs shall be assembled and secured in place in the manner shown in the Drawings.

45.2 Payments.—Except that the quantity to be paid for shall be measured in the blocks, payments under this item shall be made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Wire rope, if shown on the Drawings as a part of the permanent installation, will be paid for under Item 84.

Items 46 and 46a

Concrete in Culverts, Bulkheads, Gate Chambers, and Similar Structures, Except at Dams

46.1 **Description.**—These items shall include concrete in
46a.1 culverts, bulkheads, gate chambers and similar structures not forming part of the construction of a dam or its appurtenances; such concrete shall be placed between accurately made forms and may or may not require reinforcing steel. Such concrete may be proportioned, by volume, from about 1 of cement, 2 of sand and 4 of coarse aggregate, to about 1 of cement, 3 of sand and 6 of coarse aggregate, as the Engineer may direct.

Under Item 46a will be included all concrete in such culverts, bulkheads, gate chambers, and similar structures placed below the plane of estimated mean low water shown and so designated in the Drawings. Provided, however, that whenever for any structure no such plane is indicated in the Drawings, all concrete, whether above or below mean low water level, will be included under Item 46 and not under Item 46a.

46.2 **Payment.**—Payments under these items shall be
46a.2 made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include. These unit prices shall also include the cost of laying, but not of furnishing, vitrified pipe, when required for the inside lining of concrete culverts.

Item 47

Concrete in Manholes, Catch Basins, Sewers, and Similar Shapes

47.1 **Description.**—Concrete in manholes, sewers, catch basins, and similar shapes shall be placed against accurately built forms, and will in most cases be reinforced with steel. Such concrete may be proportioned by volume, from about 1 of cement, 2 of sand, and 4 of coarse aggregate, to about 1 of cement, 2½ of sand, and 5 of coarse aggregate.

47.2 **Payment.**—Payments under this item shall be made in accordance with Sections 0.103 and 0.104 of the Specifications, entitled Concrete—Measurement for Payment, and Concrete—Prices to Include.

Item 48

Stone Masonry

48.1 Description.—This item shall include the building of stone masonry as shown on the Drawings or as required by the Engineer. Unless otherwise shown on the Drawings, this masonry shall be of the class known as pitch-faced, range, squared-stone masonry, with backing of concrete, or of large roughly bedded stones, as the Contractor may elect. In case the courses are not of the same thickness, they shall decrease in thickness uniformly, from bottom to top.

Stones shall be hard and durable, free from seams or other imperfections, of approved size, quality, and shape, and in no case shall have less bed than rise. They shall be clean and wet at the time of laying; they shall be well bonded, laid on natural beds, and solidly settled into place in a full bed of mortar. They shall not be laid in freezing weather except under special permission and directions from the Engineer.

Face joints shall be not more than 1 inch thick, and shall be finished flush, as the stones are laid. Mortar for the joints shall satisfy the requirements of Section 0.105 of the Specifications, entitled Mortar. The maximum size of grains in fine aggregate shall be such as will pass a ¼-inch mesh screen.

At least one-fifth of the face of the wall (and of the back if stones are used for backing) shall be headers; those in the face shall be so arranged that a header shall not be laid over a vertical joint, nor shall a vertical joint occur over a header. No header shall be less in length than three times the rise of the course. The whole structure shall be bonded together in accordance with good practice.

All concrete used for backing of stone masonry shall satisfy the requirements of Sections 0.85 to 0.102 of the Specifications, entitled Concrete. Such concrete, however, will not be measured for payment as concrete, but as stone masonry, as provided hereinafter.

Stone masonry shall be kept moist for at least 2 weeks after being laid, and shall be protected from freezing until thoroughly dried out.

48.2 Payment.—The quantity of stone masonry to be paid for under this item shall be the number of cubic yards, measured in place, laid in accordance with the Drawings, Specifications and instructions of the Engineer, including whatever concrete may be used for backing or interior. The unit price stipulated for this item shall include the cost of all labor and materials incidental to com-

pleting the construction to the satisfaction of the Engineer, except the cost of cement, reinforcing steel, and other metal work, as provided elsewhere in the Specifications and except the cost of materials obtained from construction as provided in Section 0.62.

Note.—There is no Item 49.

Item 50

Cement

50.1 Brands.—Before delivery of cement is made the brand shall receive the approval of the Engineer. Preference shall be given to cements which, by their records, show uniformity of composition and tendency to maintain high strength of mortar with increased age.

50.2 Delivery and Storage.—Cement shall be delivered in cloth sacks or other strong, well-made packages, each plainly marked with the manufacturer's brand. The weight of cement contained in such packages shall be 94 pounds net, unless some other weight be adopted as a commercial standard during the life of this Contract. Packages in broken or damaged condition shall be rejected, or accepted only as fractional packages. All cement shall be dry, free from lumps, caking and water marks. Pending shipment and in transit cement shall be kept under proper seal.

At all times while cement is required, the Contractor shall have at the site of the work an abundant supply, sufficiently in advance of use to allow satisfactory tests to be made, and shall carefully guard against possible shortage on account of rejection, irregular delivery, or any other cause. The Contractor shall provide storage facilities in an approved location. Store houses shall be weathertight, shall have tight floors a suitable distance above the ground, shall be large enough to admit of keeping on hand a sufficient supply to prevent delays or interruptions to the work by irregular delivery, and shall have sufficient floor space for storing each carload separately, and affording convenient access thereto for sampling, counting of packages and removal. Suitable, accurate scales shall be provided by the Contractor for weighing, and occasionally, as the Engineer may direct, packages of cement shall be weighed by the Contractor to determine whether or not they contain full measure.

The Contractor shall employ a competent storekeeper who can speak and understand the English language, who shall have charge of the storehouse, and shall keep suitable records of the delivery and use of all cement. Copies of these records shall be furnished

the Engineer at the close of each day's work, showing in such detail as he may reasonably require, the quantity used in each part of the work during the day.

50.3 Inspection, Tests and Requirements.—The cement will be subjected to thorough inspection and tests at the place of manufacture or on the work. It shall conform in all respects to the Standard Specifications for cement, of the American Society for Testing Materials, as published in the 1915 Year Book of that Society, and in addition, standard 1 to 3 mortar briquettes shall show an increase in tensile strength of not less than 20 per cent from the test at 7 days to the test at 28 days. Cement will not be accepted if tests indicate that it does not possess reasonably uniform composition. The Contractor shall notify the Engineer a sufficient time in advance of manufacture or shipment to allow for proper sampling, and unless this is done, or if additional tests are necessary, the Contractor shall rehandle the cement in the storehouse for the purpose of obtaining samples as directed. An agent of the Board shall have the right at all times, of inspecting the raw materials and process of manufacture at the cement works.

Cement will be accepted which has passed satisfactorily all the tests as required herein, including the 28-day tensile test. After any brand of cement shall have sufficiently proved its worth in actual practice upon the work, the Engineer may, should he deem it advisable, allow its use without waiting for the result of the 28-day test. Cement kept in storage may be subjected to retesting.

If the tests prove any cement unsatisfactory which has been delivered at the site of the work, such cement shall be at once plainly marked for identification, and promptly removed from the work and its vicinity.

50.4 Payment.—Unless specifically excepted, all cement actually used in accordance with the Specifications shall be paid for at the unit price for this item, which shall include the cost of the cement, and all expense incidental to delivering it upon the work, to weighing as directed, and to putting it into the concrete, or masonry, or other parts of the work in which it is to be used. For purposes of payment, a barrel of cement shall be considered the equivalent of 376 pounds net of cement.

Cement used in concrete for filling unauthorized excavations, that used in work which is rejected as faulty or unsatisfactory, cement that is wasted, or used in excess of requirements, and all cement used by the Contractor for purposes other than those for

which payment is provided in the Contract, shall not be paid for under this item, but the cost thereof shall be considered as having been included in the price stipulated for the appropriate items.

Item 51

Reinforcing Steel

51.1 Description.—Steel reinforcement for concrete shall be free from mill scale, and shall strictly fulfill all the requirements and be subject to all the tests for the structural steel grade given in the Standard Specifications for Billet-Steel Concrete Reinforcement Bars, as published in the 1915 Year Book of the American Society for Testing Materials. Bars shall be twisted or otherwise deformed, and of the sizes and weights shown in the Drawings or ordered, and shall be secured in the positions required in an approved manner, so as to withstand, without displacement, the pouring and spading of concrete, until completely embedded.

51.2 Protection of Steel.—Steel shall be effectively protected from damage at all times, and if rust shall form, all loose rust scales shall be cleaned off with wire brushes or other implements. Any mortar, oil, grease, paint or dirt, which shall adhere to the reinforcement, shall be removed prior to imbedding the steel in the concrete. Ends of rods which are to be left projecting for a considerable time shall be painted with cement grout. Where reinforcing bars project from the concrete, precautions shall be taken to prevent the bars from being struck or jarred in such a way as to injure the bond between steel and concrete.

51.3 Payment.—The quantity of reinforcing steel to be paid for shall be the number of pounds placed in accordance with the Drawings or orders. The unit price stipulated for this item shall include the cost of metal, the royalty, if any, the cost of transporting, cutting, bending, placing, fastening in position, cleaning, protecting, and all other labor and materials connected therewith. Waste material, due to the fact that the lengths furnished are longer than necessary, and wires, clips, or other devices used for securing the metal, shall not be included for payment. The quantity paid for shall include, however, extra metal in authorized laps wherever the lengths required would be unreasonably long for single bars. In determining quantities, except as the Engineer may require test weighing on scales, commercial unit weights shall be used.

Item 52

Vitrified Brick Lining

52.1 Description.—Vitrified brick shall be used for lining sewers, and for the invert and a portion of the sides of the outlet conduits at Dams, as shown on the Drawings or ordered. The brick shall be thoroughly vitrified, of the size commercially known as Vitrified Blocks, not less than 3½ inches wide, 4 inches deep and 8½ inches long, except in case of sewers, where smaller sizes may be required. Brick shall not vary more than ⅛ inch in depth or width, or more than ½ inch in length. They shall have square edges, with wirecut or otherwise satisfactorily roughened side surfaces for the adhesion of the mortar. Lugs of such thickness as to prevent laying with 3/16-inch face joints will not be acceptable. Not more than one brand of bricks shall be used in any one construction.

52.2 Quality of Brick.—All brick shall be evenly burned, thoroughly annealed, tough, durable, and regular in size and shape. When broken, they shall show a dense stonelike body, free from lime, air-pockets, cracks or marked laminations. No surface of any brick shall have kiln marks more than 3/16 inch in depth, or cracks more than ⅜ inch in depth, and the exposed face as laid shall have no kiln marks more than 1/16 inch in depth, and shall be free from cracks. They shall not absorb more than 2 per cent of their weight of water during 24 hours submersion. The face to be exposed shall be straight and all bricks so warped in the burning as to lay unevenly in the work shall be rejected. No chipped edges shall be allowed at the exposed faces. Where brick are to be used for lining the interior of the conduits where high velocities will be encountered, unusually even and good quality is demanded, and all bricks of quality at all questionable will be rejected.

52.3 Rattler Test.—Brick shall be subject to the rattler test conducted by the Engineer in accordance with the standard specifications for paving brick, published in the 1915 Year Book of the American Society for Testing Materials. Not more than one test for each 10,000 bricks will be required. Each test shall consist of 5 samples of 10 bricks each. One sample shall be taken from what appear to be the softest brick, 1 from the hardest, and 3 samples representing an average of the whole. For acceptance, the bricks shall not lose in the test more than 22 per cent by weight, and the quality of the brick shall be of such uniformity that the difference in weight after the test between the highest and the lowest

of the 5 samples shall not exceed 8 per cent. Any lot of bricks failing to pass this test may be culled or regraded in the presence of the Engineer and retested. If the second test fails the entire lot shall be rejected.

If the brick are all of sufficient uniformity, or the grading of them as they come from the kiln is so well done as to warrant it, the rattler test may be made from a single sample of a given lot or shipment instead of the 5 samples as above specified. Such samples shall consist of 10 representative bricks, 2 from what appear to be the softest of the lot, 2 from the hardest, and the other 6 representing the average. The 10 brick selected for the test shall be of approximately equal weight, within at least 2 per cent of their average. After the test the range of weight between the heaviest and the lightest individual whole brick shall not exceed 8 per cent, and the lightest individual whole brick shall weigh at least 78 per cent of the average weight of the 10 before test. Excessive breaking of brick during test shall be cause for rejection.

52.4 **Sampling.**—The Contractor shall immediately notify the Engineer of the arrival, at a designated point of unloading, of a shipment of brick, and shall furnish without charge therefor such labor and other assistance as may be necessary for the examination of the shipment and the taking of samples. The contents of each car shall be kept separate from others and clearly marked for indentification. Brick shall not be dumped in piles or unloaded in such manner as to chip the corners and edges.

52.5 **Inspection.**—In addition to the tests prescribed, the brick shall be carefully inspected after arrival upon the work, and those which do not conform to the specifications, shall be rejected. In case any lot of bricks is brought to the work containing 10 per cent or more not up to the specifications, showing that they have not been properly culled, the entire lot may be condemned, in which event they shall be removed at once.

52.6 **Method of Laying.**—Brick shall be laid with the long dimension parallel to the axis of the conduit, in mortar mixed in proportions, by volume, of 1 of cement, to 2 of sand. Adjacent courses shall break joints at least 3 inches. The mortar shall conform to the requirements of Section 0.105 of the Specifications, entitled Mortar. Crusher dust, or screenings, or crushed limestone will not be acceptable for use in mortar. The bricks shall be laid accurately to line and grade with face joints not exceeding 3/16 inch in width, and shall be completely imbedded in mortar at the

bottom, side and end, at one operation. The joints shall be pointed flush with the face of the brick at the time of laying, to the end that the exposed surface shall be smooth and even. The concrete backing shall be thoroughly wet just before laying to prevent injurious absorption. More than ordinary care will be required in this work, to the end that the finished work will contain no voids, and that the smoothest practicable finished surface will be obtained. Carborundum brick or emery wheels shall be used, if necessary, to obtain a true, smooth surface.

Contraction joints in the brick lining shall coincide with the contraction joints in the invert and arch of the conduit. Adjacent to contraction joints, where necessary, squarely-broken bats shall be used, but in no case shall bats of less than one-half the original length be used. Brick lining shall be kept moist for such period of time as the Engineer may direct, to prevent injurious drying out of the mortar. No brick lining shall be laid when the weather conditions are such as to cause injury to the mortar from freezing or other causes.

52.7 **Payment.**—The quantity of vitrified brick lining to be paid for under this item shall be the number of cubic yards actually laid in accordance with the Drawings and Specifications. The unit price for this item shall include the cost of all labor and materials necessary for furnishing and properly laying the bricks in mortar, and of properly finishing the surface, and all expense incidental thereto, with the exception of cement which shall be paid for under Item 50.

Item 53

Drilling Foundations or Masonry

53.1 **Description.**—Under this item the Contractor shall, if ordered, drill holes in rock, concrete, or masonry for grouting, for inspection, for drainage, or for other purposes, at the places and to the depths to be designated by the Engineer. The diameter of such holes shall be not less than 2 inches, unless otherwise ordered. Holes shall not be smaller in diameter than the size ordered, and not more than ½ inch larger, and shall be drilled by means of diamond, shot, or other suitable rotating type of drill, capable of boring a smooth hole without disturbing the adjacent rock walls. Churn drills or other types of drills operating by means of concussion shall not be used for this purpose, unless special written permission from the Engineer is given for such use.

53.2 Payment.—The quantity to be paid for under this item shall be the actual number of linear feet drilled in accordance with orders. The unit price stipulated for this item shall include all expense necessary for drilling the holes as required.

Item 54

Grouting Foundations or Masonry

54.1 Description.—Under this item the Contractor shall place pipes for grouting or drainage operations, and shall force cement grout into such pipes or into holes drilled under Item 53, to the extent required to test the foundation or to close any seams in the rock, concrete, or masonry that may be found to exist.

54.2 Pipes.—Under this item the Contractor shall, if ordered, set in the holes drilled under Item 53, and at such other places as may be directed, pipes for grouting or for tests. The pipes shall be standard weight merchant pipe, not greater than 2½ inches in nominal diameter, fitted with standard couplings. Any other standard fittings shall be supplied, and all cutting, threading, cold bending and fitting shall be done necessary to place the pipe complete as ordered. Water-tight joints shall be made between the pipes and the sides of holes drilled in rock or masonry, with an approved filler, and by an acceptable method.

54.3 Grout.—Under this item the Contractor shall also, if ordered, force grout composed of cement and water, or of cement, sand and water, in proportions to be prescribed, into seams in any ledge rock, or any other places as directed. Sand for grout shall be clean, and shall be of such fineness that 100 per cent will pass a sieve having 64 openings per square inch, and 45 per cent will pass a sieve having 1,600 openings per square inch.

54.4 Mixing and Placing Grout.—The apparatus for mixing and placing grout shall be of an acceptable type, equal in efficiency to a machine having for its essential part an air-tight chamber in which the grout is effectively stirred, and from which it is forced into the work by air under any required pressure up to 80 pounds per square inch. Grouting shall be so conducted that the Engineer will be satisfied that the desired filling has taken place. Holes shall be made, if ordered, to test the efficacy of the filling. If it be discovered that any voids have not been thoroughly filled by the first application of grout, the process shall be repeated until satisfactory results are obtained.

54.5 Payment.—The quantity of grout to be paid for under this item shall be the actual number of cubic yards mixed in accordance with directions, measured in its liquid state before being forced into the work. The Contractor shall provide suitable means for convenient measuring. The unit price stipulated for this item shall include all labor and materials necessary for doing the grouting, as directed, except that cement and pipe will be paid for under the items provided therefor.

Item 55

Furnishing Vitrified Round or Channel Pipe

55.1 Description.—Vitrified hub and spigot pipe and fittings of various sizes from 4 inches up to 36 inches, as shown on the Drawings or ordered, may be used for sewers, drains, small road culverts, and other purposes as directed. They shall be vitrified, salt glazed, double strength, or standard, stoneware pipe of reasonably true cylindrical form, well and thoroughly burned, without warps, cracks or other imperfections. Each piece shall be carefully inspected immediately before being laid, and no cracked, or broken, or otherwise imperfect pipe shall be used; except that the Engineer may pass minor defects which in his opinion do not impair the fitness of the pipe for the purpose intended.

55.2 Payment.—The pipe to be paid for under this item shall include the quantity in linear feet of straight pipe, or the number of pieces of fittings, actually placed in good condition as shown on the Drawings or as required by the Engineer. The unit prices stipulated for this item shall include the cost of furnishing, transporting, storing, cutting, and all other expenses incidental to delivering the pipe and fittings at the site of the work in condition to pass inspection just before being laid.

Note.—The price bid under this item will be stated as a discount from the price list adopted by Eastern Manufacturers, May 2, 1912.

Item 56

Laying Vitrified Round or Channel Pipe

56.1 Description.—The pipe shall be laid true to the lines and grades, resting uniformly for its entire length upon the bottom of the trench with joints either wholly or partially filled with cement mortar as required. The spigot shall be truly centered in the hub and there shall be no shoulder or uneveness of any kind occurring

in the bottom half of the pipe. In sewers or in those portions of the pipe drains which are laid with mortar joints, especial care shall be taken that the joint space be of uniform widths around the pipe, and where full mortar joints are required, jute or oakum gaskets soaked in cement grout shall be firmly caulked in the joints. The mortar shall be thoroughly worked into the joint, and a sufficient overfill made to hold the mortar in the joints firmly in place. The interior of the pipes shall be carefully cleaned after laying to remove dirt, mortar or other obstructions, and all pipes shall be left in a satisfactory and cleanly condition at the termination of this Contract.

56.2 **Payment.**—The work to be paid for under this item shall include the number of linear feet, measured along the tops of the pipes after they are laid in accordance with the Drawings and requirements. Provided, however, that when vitrified pipe is used for the inside lining of concrete culverts, no payment will be made for laying the pipe, but the cost of such laying shall be included in the price bid for the concrete. The unit prices stipulated for this item shall include the cost of all work connected with the laying of the pipe and fittings, making the joints, replacing broken pipe and all other expense incidental to completing the work in a satisfactory manner. These unit prices shall not include the cost of pipe, or of cement, or of excavating and backfilling the trench, which will be paid for under the items provided therefor.

Note.—The price bid under this item will be stated in terms of cents per inch of diameter per linear foot.

Item 57

Dry Rubble Paving

57.1 **Description.**—Dry Rubble Paving shall consist of sound, durable, stones having established weathering qualities, imbedded in sound, durable crushed rock or gravel, which shall be not larger than 2½ inches maximum size. Stone blocks shall have roughly squared top faces. None of the softer varieties of limestone found in this locality are satisfactory for Dry Rubble Paving.

57.2 **Method of Laying.**—All paving shall be of the thickness and extent shown on the Drawings or ordered. At least one-third of the area of the paving shall be composed of stones having a depth equal to the thickness of the paving, and the majority of the stones shall have a depth of at least two-thirds the thickness of the paving. No stone having a depth less than one-half the thickness of the

paving shall be used. The stones of the various depths shall be well distributed. Stones shall be placed by hand, close together, and thoroughly imbedded in the crushed rock or gravel foundation. All voids shall be filled with crushed rock or gravel, and the joints of the face of the paving filled with tightly-driven spalls.

57.3 **Payment.**—The quantity of Dry Rubble Paving to be paid for under this item shall be the number of cubic yards actually placed within the limits prescribed. The crushed rock or gravel used in this connection shall be included for payment under this item. The price stipulated for this item shall include the cost of all work and materials, and all expenses incidental to preparing the foundation and constructing the paving.

Item 58
Rip-Rap

58.1 **Description.**—Rip-Rap of required thickness and composed of tough, durable stones of the sizes to be prescribed, shall be placed as designated in the Drawings or ordered. Stones placed on or in the slopes of embankments, as a result of the grading of embankment material, will not be classed as rip-rap. The Contractor will not be required to place rip-rap by hand, with the exception of such hand work as is necessary to conform to the specified lines. None of the softer limestone formations found in this locality are acceptable for rip-rap, and only such of the harder limestone as quarry to acceptable shapes and sizes, and the larger boulders, will be satisfactory.

58.2 **Payment.**—The quantity of rip-rap to be paid for under this item shall be the volume in cubic yards actually placed within the prescribed limits. The unit price stipulated for this item shall include the cost of all work incidental to furnishing and placing the rip-rap, and leaving it in satisfactory condition.

Item 59
Gutter Paving

59.1 **Description.**—Cobble gutters shall be laid along the berms on the slopes of the Dams, and at other places as shown on the Drawings or ordered. The stones used shall be tough, durable, rounded cobbles of the size shown on the Drawings, except that, if permitted by the Engineer, durable quarry stone of acceptable sizes and shapes may be used. The stones shall be laid with the longest dimensions vertical, and the largest stones shall be selected and placed along the outside of the gutter. All the stones shall be bedded in cement mortar to the extent and in the manner shown on the Drawings.

59.2 **Payment.**—The quantities to be paid for under this item shall be the number of square yards in place as shown on the Drawings or designated by the Engineer. The unit price stipulated for this item shall include the cost of all labor and materials and all other expense necessary for completing the cobble gutters, except cement which will be paid for under the item provided therefor.

Item 60

Crushed Rock or Gravel

60.1 **Description.**—Whenever ordered, screened or unscreened crushed rock or gravel which will pass a 2½-inch ring, and, if screened, will be retained on a ¼-inch mesh screen, shall be furnished and spread for surfacing roads, or furnished and placed for permanent drains, filling back of retaining walls or other structures, or for miscellaneous uses not mentioned herein. The softer limestones of this locality are not acceptable for crushed rock under this item. Unless otherwise designated specifically on the Drawings the material shall be screened, and the Contractor may furnish under this item either crushed rock or gravel, as he may prefer.

60.2 **Payment.**—Crushed rock or gravel shall be measured in place, and the quantity to be paid for shall be the number of cubic yards actually placed, according to the Drawings or orders, within the prescribed limits. The unit price stipulated for this item shall include the cost of all work necessary for furnishing, screening, spreading, or placing the materials. It shall not include the cost of rolling material used for road surfacing, which, when required, will be paid for as extra work. Crushed rock or gravel used for concrete, for rolled macadam or gravel road paving, for foundation for dry rubble paving, for rip-rap, or for other purposes for which payment is provided under other items, shall not be paid for under this item.

Items 61, 62, 63, 64x, 65, and 66

Paving for Streets and Highways

61.1 **Description.**—Paving of the required dimensions and
62.1 composition shall be placed for streets and highways as
63.1 shown in the Drawings or designated by the Engineer.
64.1 Item 61 shall include all such gravel paving.
64x.1 Item 62 shall include all water-bound macadam
65.1 paving.
66.1 Item 63 shall include all bituminous-bound macadam paving.

Item 64 shall include all brick paving on concrete foundation.

Item 64x shall include all brick paving on rolled foundation.

Item 65 shall include all concrete paving.

Item 66 shall include all other paving not mentioned herein, which may be needed for replacing or extending existing pavements. Such paving shall be built in accordance with the specifications for the original pavement, if available; otherwise, in accordance with good practice, as directed.

Note.—The following specifications for paving are copied, with minor changes, from the standard specifications of the Ohio State Highway Department:

61.2 62.2 63.2 64.2 64x.2 65.2 **Size of Aggregates.**—The various sizes of mineral aggregates of all grades, separated by screens having circular openings of the diameters specified, will be designated throughout these Specifications by the following system of numbers:

No. 1—Material passing through a 4-inch and retained on a 2½-inch opening. No. 1 size for stone with an abrasion loss of less than 6 per cent shall consist of material passing through a 3½-inch and retained on a 2-inch opening.

No. 2—Material passing through a 2½-inch and retained on a 1½-inch opening.

No. 3—Material passing through a 1½-inch and retained on a ¾-inch opening.

No. 4—Grit. Material passing through a ¾-inch and retained on a ¼-inch opening.

No. 5—Screenings. Material passing through a ¾-inch opening and containing not more than 80 per cent nor less than 40 per cent of material that will be retained on a ¼-inch opening or square mesh.

No. 6—Grit. Material passing through a ½-inch opening and retained on a 3/16-inch opening or square mesh.

No. 7—Screenings. Material passing through a ¼-inch opening or square mesh and containing not more than 30 per cent of material that will pass a number 100 sieve.

No. 23—Material passing through a 2½-inch and retained on a ¾-inch opening.

All of the above material shall be so graded in size that in no case, by laboratory test, will more than 10 per cent pass the smaller opening mentioned.

No. 34—Material passing through a 1½-inch opening, and by laboratory test containing not more than 5 per cent of material that will pass a ¼-inch opening, and not more than 75 per cent of material that will pass or be retained on a ¾-inch opening.

61.3 62.3 63.3 64.3 64x.3 65.3 **Materials.**—All cement required under these items shall conform to the requirements specified under Item 50 of these Specifications, and all reinforcing bars shall conform to the requirements specified under Item 51.

Unless other specifications are given herein, materials other than cement and reinforcing steel to be used under these items shall meet the requirements as specified in Material Specifications No. 4, 1915, of the Ohio State Highway Department, as follows: **(In the following paragraphs, to the end of paving specifications, item numbers refer to these Specifications; section numbers, unless otherwise noted, refer to Ohio Highway Department, Material Specifications, No. 4, 1915.)**

Mineral aggregate for the bottom course, required under Item 61, shall meet the requirements as specified under Section 4.3 except that the particles shall be of such size that all will pass through a 2½-inch circular hole.

Mineral aggregate for the top course, required under Item 61, shall meet the requirements as specified under Section 4.3, except that the particles shall be of such size that all will pass through a 1-inch circular hole.

Mineral aggregate for the bottom course, required under Items 62 and 63, shall meet the requirements as specified under Section 3.3; mineral aggregate for the top course, required under Items 62 and 63, shall meet the requirements as specified under Section 3.2. Screenings to be used as a filler shall be of a quality at least equal to that of the other materials in the same portion of the work. Bituminous materials (penetration method) shall meet the requirements as specified under Section 6.1.

Coarse aggregate for concrete required under Items 64 and 64x, shall meet the requirements as specified under Sections 3.3 or 4.2. Fine aggregate for concrete, required under Items 64 and 64x, shall meet the requirements as specified under Section 4.5. Coarse aggregate for concrete required under Item 65 shall meet the requirements as specified under Sections 3.1 or 4.1. Fine aggregate for concrete required under Item 65 shall meet the requirements as specified under Section 4.4. Sand for use as cushion shall meet the requirements as specified under Section 4.7. Sand used in grout

filler shall meet the requirements as specified under Section 4.6. Paving brick shall meet the requirements as specified under Section 2.1. Sandstone for curbing shall meet the requirements as specified under Section 3.7. Mineral aggregate for the foundation course, required under Item 64x, shall meet the requirements as specified in Section 3.3.

61.4 62.4 63.4 64.4 64x.4 65.4 **Roller.**—The rolling of the sub grade, the macadam, and the foundation material other than concrete, shall be done with a self-propelled three-wheeled roller weighing not less than 10 tons, nor more than 13 tons. The rear wheels shall be not less than 5 feet in diameter, shall have coned surfaces, shall be of such widths that the average weight per linear inch will be not less than 350 pounds, and the distance out to out shall be not greater than 84 inches. The width of the front roller shall be at least 6 inches greater than the clear distance between drivers.

61.5 62.5 63.5 64.5 64x.5 65.5 **Sub Grade.**—After the surface of the sub grade has been properly shaped and suitable drainage provided, and before any foundation or other material is placed thereon, the road bed shall be thoroughly rolled and compacted so that it does not wave or spring under the roller. When the rolling is completed the surface of the sub grade shall conform to the cross-section shown on the Drawings or ordered, and shall be so maintained until foundation or other material is in place. The Contractor shall use reasonable care to prevent tracking and rutting of the sub grade after it has once been formed and rolled. If tracks or ruts are formed, the Contractor shall scarify, reshape and reroll the sub grade.

61.6 62.6 63.6 64x.6 **Placing Water-Bound Bottom Course.**—Upon the properly prepared sub grade there shall be spread a layer of foundation material which, together with the shoulders, shall be rolled until the entire foundation has been thoroughly keyed and compacted and all interstices reduced to a minimum. No coarse foundation material shall be placed until the screenings for filling the same shall have been neatly stored along the side of the highway. Low places that develop during rolling shall be brought to the proper elevation with the same kind of material as that of which the course is constructed.

The size of gravel required for the bottom course under Item 61, shall be as specified under 61.3. The size of aggregate required

for the bottom course under Items 62, 63, and 64x, shall be of graded No. 1 or No. 2 stone, or a uniform mixture of same, as directed, except that if specifically allowed by the Engineer a limited amount of No. 3 Stone may be used. Screenings used during the finishing process of dry rolling shall be of the size or sizes required by the Engineer. The broken stone shall be thoroughly harrowed after being spread and before being rolled, if required.

When thoroughly rolled and keyed, screenings or other filler suitable for the class of work to be done shall be cast upon the stone or gravel during the finishing process of dry rolling in such amount and manner as will completely fill the interstices and form a compact mass. Sufficient water shall be applied, rolling continued, and screenings added until the stones or gravel cease to sink under, or move in front of, the roller. Upon completion, the foundation material shall have the thickness indicated in the Drawings. Macadam must not be rolled when sub grade is soft, or yielding, or when the rolling causes a wave-like motion in the macadam or sub grade. Any disturbance or alteration of the surface of the prepared bottom course shall be corrected before the next course is placed.

61.7 62.7 **Placing Water-Bound Top Course.**—The size of gravel required for top course under Item 61 shall be as specified under 61.3. The size of aggregate required for top course under Item 62 shall be No. 1 or No. 2 stone, as required, and No. 5 and No. 7 screenings.

The work required under Items 61 and 62 shall be performed in strict conformity with the provisions of this section so far as same are not inconsistent with the use of gravel for the top course required under Item 61. A course of stone or gravel shall be spread on the bottom course to such thickness as will produce the completed depth indicated on the Drawings. Cubical blocks of wood, or side and center guide forms of proper size, shall be used to fix the depth of the loose material. In spreading, care must be taken to preserve the grade and crown, also to prevent any wavy surface. After the stone is spread upon the foundation it shall be harrowed to aid in producing a uniform and even surface. Any thin, flat, or oversize stones that appear on the surface, at any time during the process of construction, shall be removed therefrom.

The top course shall then be rolled until the material ceases to sink under, or move in front of, the roller. The rolling shall begin with the outside driver covering equal parts of the metal and shoulder, and the roller shall be run forward and backward along

the edge of the metal until the shoulder and metal are firmly bound together. When the shoulders and the sides of the macadam have been firmly rolled, the rolling shall progress gradually toward the center, from each side, until the entire course has been thoroughly keyed, the interstices of the metal have been reduced to a minimum, and all settlement has ceased. Any low places that develop during rolling shall be loosened and then refilled with the same kind of material as that of which this course is constructed and again rolled as required herein. Number 5 or 7 screenings, or both, as required, shall be applied gradually during the finishing process of dry rolling in such an amount as will completely fill the interstices. The screenings shall not be dumped on the surface of the stone, but shall be cast thinly with a spreading motion of the shovel from piles at the roadside. After each light application of screenings the surface shall be well rolled. The screenings shall not be allowed to cake or bridge on the surface of the stone in such manner as to prevent the perfect filling of all voids and the direct bearing of the roller on the surface of the stone during the finishing process of dry rolling. It may be required that the screenings be swept in with rattan or steel brooms. The rolling shall continue while the screenings are being spread, so that the jarring effect of the roller will aid them in settling to the bottom. The spreading and rolling shall continue until no more screenings will go in dry. No excess of screenings shall be used before applying water.

Immediately after the voids of a section of pavement have been filled with screenings, the macadam shall be sprinkled until saturated, the sprinkler being followed by the roller. More screenings shall be added if necessary. The sprinkling, sweeping and rolling shall continue until a grout has been formed that will fill all the voids and will form a wave before the wheels of the roller. The macadam shall be kept wet at least twenty-four hours before the final rolling, and it shall be puddled as many times as may be necessary to secure satisfactory results.

When a section has been thoroughly grouted as described above, such section shall be left to dry out, after which it shall be opened to travel, but the surface shall be maintained until the entire highway has been accepted. Before final acceptance, a very thin layer of screenings shall be spread over the entire surface for a wearing coat. Ashes and cinders from fire boxes shall not be dumped on the metal. Any litter that may be dropped on the metal must be removed before the roller passes over it. The Contractor shall not work on macadam roadway construction during freezing weather.

63.7 Placing Bituminous-Bound Top Course.—(Penetration Method).—Both coarse and fine aggregates to be used in connection with bituminous materials shall be clean and free from all dust, dirt or other foreign matter. Upon the bottom course there shall be spread a course of No. 1 or No. 2 stone, as required, of sufficient depth to roll to the finished thickness shown on the Drawings. Cubical blocks of wood, or side and center guide forms of proper size shall be used to fix the depth of the loose material. In spreading, care must be taken to preserve the grade and crown, and also to prevent a wavy surface. After the stone is spread upon the foundation, it shall be harrowed to aid in producing a uniform and even surface. Any thin, flat, or oversize stones that appear on the surface at any time during the process of construction, shall be removed therefrom. The stone shall be so treated by harrowing and rolling that the surface will be free from all dust and fine material when the bituminous material is applied.

The top course shall then be rolled until the metal ceases to sink under, or move in front of, the roller. The rolling shall begin with the outside driver covering equal parts of the metal and shoulder, and the roller shall be run forward and backward along the edge of the metal until the shoulder and metal are firmly bound together. When the shoulders and sides of the macadam have been firmly rolled, the rolling shall progress gradually toward the center, from each side, until the entire course has been thoroughly keyed, and all settlement has ceased. Any low places that develop during rolling shall be loosened and then refilled with the same kind of material as that of which this course is constructed, and again rolled, as required herein. During the finishing process of rolling, any large voids in this course shall be partially filled with No. 4 grit which shall be whipped into the surface from shovels. When necessary, the rolling shall be continued during the application of the grit. The voids in this top course shall be just sufficiently filled so that the amount of bituminous material specified will fill the remaining voids and produce a dense surface when the road is completed. Any dust remaining on the surface stone shall be removed by sprinkling with water. Sufficient time for the stone to dry shall elapse before any bituminous material is applied.

Without disturbing the stone and grit, placed and rolled as described, the bitumen, of the quality specified, and heated to a temperature between 250 and 350 degrees F., as required, shall be uniformly applied to the surface by means of approved pressure distributors or hand sprinkling pots. The total quantity of bitumen used, including the seal coat, shall be not less than 2½ gallons per

square yard of pavement surface. Immediately after the bituminous binder is applied, there shall be evenly spread over the entire surface, hard, clean, number 4 grit of stone, slag, or gravel in amount sufficient to fill the surface voids. The grit shall be evenly distributed with a push broom to insure the filling of the voids, and shall be so applied as to leave a minimum amount of grit on the surface. The road shall then be thoroughly rolled before the bitumen stiffens enough to prevent the grit from being readily incorporated with it. The rolling shall continue until a firm and smooth surface results, conforming to the requirements of the Drawings. Any surplus loose grit not held by the bitumen shall be swept off and the surface kept clean until the seal coat of bitumen is applied.

After this rolling, a seal coat of not less than ½ gallon of the same bituminous material heated as specified heretofore, shall be uniformly spread over each square yard, and the surface again covered with number 4 or number 6 grit at the rate of about one cubic yard to 70 square yards of surface. The road shall then be rolled until thoroughly compacted. A sufficient amount of grit shall be left on the surface to protect the road while setting.

64.6 Placing Concrete Foundation for Brick Pavement.—Except where otherwise specifically prescribed under Item 64, all concrete construction required under that Item shall be performed in strict conformity with the provisions of Sections 0.85 to 0.105 inclusive, of these Specifications.

The Contractor shall provide a suitable templet cut to conform to the crown indicated on the Drawings. Immediately prior to placing the concrete, the subgrade shall be brought to an even surface, and shall be thoroughly compacted. The surface of the subgrade shall be thoroughly wet, but shall show no pools of water or mud when the concrete is placed thereon.

Concrete over all new trench excavations, unless otherwise shown on the Drawings, shall be reinforced by twisted or otherwise deformed bars having a sectional area of not less than 25/100 of a square inch, placed 2 inches from the bottom of the concrete slab, extending over the full width of the trench and at least 2 feet on each side.

After the surface of the concrete has been shaped by the use of the templet, it shall be floated in such manner as to thoroughly compact the concrete and produce a surface which shall conform so nearly to that indicated on the Drawings that it will nowhere vary more than one-half of an inch from the templet, or from a ten-foot straight edge applied to the surface of the concrete parallel to the center line of the pavement.

Concrete curbs of the dimensions shown on the Drawings shall be constructed in the manner specified for concrete foundation.

64.7 Brick Pavement.—Directly before the pavement is laid, a cushion of sand shall be spread evenly over the completed foundation. The completed depth of the cushion shall be 1½ inches unless otherwise shown on the Drawings. The sand shall be sufficiently dry to permit of proper spreading. The templet shall be drawn forward and backward until the surface of the cushion conforms exactly to the required cross-section. The cushion shall be uniformly compacted by a roller having a weight of not less than 10 pounds per inch of width of roller, and a diameter of about 24 inches. The total width of roller shall be not greater than 30 inches. After rolling, the templet shall again be drawn over the cushion. Any depressions shall be brought to the proper grade by the addition of sand, and the surface struck off with the templet and rerolled. The use of the templet and roller, and the adding or removing of sand, shall be repeated until a uniformly compacted sand cushion of the required depth and surface is obtained. When completed, the top of the cushion shall be at a depth below the top of curb equal to the depth of the block less the amount necessary to bring the surface of the finished pavement ¼ inch above the curb on each side. Care must be taken not to disturb the cushion before placing the blocks.

In moving paving blocks from the plant to the site of the work, throwing, dumping or other rough treatment of the blocks which will materially injure the same, will not be permitted. They shall be piled neatly, in proper quantity, outside the curb before the final preparation of the subgrade. In delivering the blocks from these piles to the paver, they must not be dumped from wheel barrows, but shall be carried or conveyed on gravity carriers or other suitable devices.

Blocks shall be laid with the best edge up, in straight courses, across the road, and so as to break longitudinal joints approximately at the center of each block. The long dimensions of the blocks shall be perpendicular to the center line of road on the tangents, and practically parallel to radius of curve when the latter is greater than 150 feet. All blocks shall be laid with the lugs in the same direction and set as closely together as possible. Whole blocks shall be used except in starting or finishing a course, and in all cases, the end joints shall be made close and tight, the joints to be at right angles to top and sides. The cutting or trimming of blocks shall be done by experienced men, and proper care shall be taken not to

fracture or injure the parts to be used. The fractured ends shall be turned toward the center of the roadway. All blocks when laid shall be clean, and kept clean, and entirely free from dirt or other foreign matter, until the pavement is completed. The pavement shall be thoroughly dampened by sprinkling, and all soft, porous, or unacceptable blocks will be marked by the inspector and shall be removed and replaced by the Contractor. When any section of roadway shall have contained more than 10 per cent of rejections, the entire section shall be rejected and rebuilt.

Unless otherwise shown on the Drawings, blocks known as Hillside Pavers shall be used on all grades over 5 per cent.

As soon as possible after the blocks in the pavement are inspected, rejections removed and replaced with acceptable blocks, the surface shall be swept clean and then rolled with a self-propelled tandem roller weighing not less than 3 tons nor more than 6 tons. The rolling shall begin at the side of the pavement, the roller being operated slowly, parallel to the center line and working inwardly until the center of the road is reached, when the roller shall move to the opposite side and proceed as before. As the roller passes back and forth, it shall overlap its course each time. After one rolling of the entire surface, the speed of the roller may be increased and the rolling continued until the blocks are thoroughly and evenly bedded in the sand cushion. Any blocks that are not acceptable after the rolling shall be removed and replaced with acceptable ones. Portions of the pavement inaccessible to the roller shall be thoroughly rammed with a paver's rammer weighing not less than 50 pounds, a plank not less than 6 feet long, 10 to 12 inches wide and 2 inches thick being interposed between the pavement and the rammer. The plank shall be laid parallel to the curb and moved so that the surface will be rammed equally and brought to the proper elevation. When the rolling and ramming are completed properly, the surface of the pavement shall conform so nearly to that indicated on the Drawings that it will nowhere depart more than ⅜ inch from properly formed templets or a 10-foot straight edge applied to its surface parallel to the curb. After rolling and tamping, the joints shall be inspected, and if the cushion has been forced up between the blocks more than ½ inch, they shall be relaid and re-rolled.

Soon after the pavement has been properly compacted and surfaced, and before any dirt or other foreign matter has entered the joints, they shall be filled with cement grout filler. The blocks shall be thoroughly wet immediately before the filler is applied. The

grout filler shall consist of an intimate mixture of equal parts of sand and cement. After the sand and cement have been thoroughly mixed dry until the mass assumes a uniform color, a batch not exceeding 2 cubic feet of the mixture shall be placed in a suitable box or a machine specially adapted for that purpose and thoroughly mixed, while water is being added slowly, until there results a grout of the consistency of thin cream. The mixing shall be continued until all the grout is removed and applied to the surface in small quantities. Grout shall be applied first in sufficient quantity to about half fill the joints and as soon as it is placed upon the pavement, it shall be thoroughly swept into the joints. The filling shall be carried forward in line until an advance of about 50 feet has been made. Before the first has begun to set, the second, a slightly thicker coat, shall be applied in a manner similar to that just described, and shall be sufficient to completely fill the remaining space in the joints. As rapidly as the grout is applied, it shall be swept with brooms until the joints are completely filled. In no case, however, shall the grout be swept more than a few feet from the place where it is applied to the surface. To insure a full joint, a rubber squeegee shall then be pushed across the joints at an angle of about 45 degrees.

The Contractor shall provide thin metal strips 1/16 inch by 6 inches, 3 feet long, and insert same in the brick joints across the roadway when closing up a stretch of grouting at work intervals, so that the grouting will end in a vertical joint. These strips must be taken out when the grout becomes stiff.

After the filler has been placed and has attained its initial set, one inch or more of sand, earth, or other suitable material, shall be spread over the entire surface, and shall be kept wet for at least 10 days. No traffic shall be allowed on the pavement during this 10-day period, or during a longer period, if necessary. All sand and other accumulations must be removed and the pavement thoroughly cleaned before final inspection.

Expansion joints of the dimensions indicated, shall be placed where shown on the Drawings. Joints shall extend the full depth of the bricks. A prepared bituminous material that will remain pliable at all temperatures to which it may be subjected as a street paving filler shall be used for filling these joints. It shall consist of all-bituminous (or a bituminous mastic) filler containing not less than 35 per cent pure bitumen. The material shall be premolded into strips of suitable length and of the required depth and thickness. and shall be laid in the pavement with the ends closely joined

as the bricks are being laid. The filler shall completely fill the joint when in place and no gravel, cement, or other foreign matter shall be left in any part of the joint.

64x.7 Placing Concrete Curb.—Concrete curbs of the dimensions shown on the Drawings shall be constructed in accordance with the provisions of Sections 0.85 to 0.105 inclusive, of these Specifications.

65.6 Concrete Pavement.—Except when otherwise specifically prescribed under Item 65, all concrete construction required under that item shall be performed in strict conformity with the provisions of Sections 0.85 to 0.105 inclusive, of these Specifications.

65.7

Coarse aggregate shall consist of No. 34 size; each particle shall be clean, hard, durable and free from deleterious matter.

Immediately prior to placing the concrete, the subgrade shall be brought to an even surface and shall be thoroughly compacted. The surface of the subgrade shall be thoroughly wet, but shall show no pools of water or mud, when the concrete is placed thereon.

Concrete over all new trench excavations, unless otherwise shown on the Drawings, shall be reinforced by twisted or otherwise deformed bars having a sectional area of at least 25/100 of a square inch, placed 2 inches from the bottom of the concrete slab, extending over the full width of the trench and at least 2 feet on each side. The pavement shall be placed in one course. The Contractor shall provide a suitable templet cut to conform to the crown indicated in the Drawings. The surface of the concrete shall be struck off by means of the templet which shall be moved with a combined longitudinal and cross wise motion. When the templet is within three feet of a transverse joint, it shall be lifted to the joint and the pavement struck off by moving the templet away from the joint. Any excess concrete shall be removed. Any holes left by removing any material or device used in constructing the joint shall be immediately filled with mortar composed of 1 part of cement and 1½ parts of fine aggregate.

After being brought to the established grade with the templet, the concrete shall be finished from a suitable bridge, no part of which shall come in contact with the concrete. The concrete shall be finished with a wooden float 6 inches wide, and not less than 16 or more than 24 inches long, in a manner to thoroughly compact it

and produce a surface free from depressions or inequalities of any kind. The finished surface of the concrete shall conform so nearly to that indicated on the Drawings that it will nowhere vary more than ¼ inch from the templet or from a 10-foot straight edge applied to the surface of the concrete parallel to the center line of the pavement. A finishing machine of approved type which will produce these results may be used. The edges of the pavement shall be rounded or beveled as shown on the Drawings.

Transverse joints shall be ¼ inch in width, and shall be placed across the pavement perpendicular to the center line, 30 feet apart unless otherwise shown on the Drawings. All joints shall extend through the entire thickness of the pavement, and particular care must be taken to have the joint perpendicular to the surface. The joint shall be formed by inserting during construction, and leaving in place, the required thickness of joint filler which shall extend through the entire thickness of the pavement, and shall project not less than ½ inch above the finished surface. This joint filler shall consist of tarred paper or a premolded joint composed entirely of bituminous materials, or of a bituminous mastic consisting of not less than 35 per cent pure bitumen. The concrete adjacent to these joints shall be finished with a wooden float, divided through the center, and which will permit finishing on both sides of the filler at the same time in such manner as to leave the two edges at the same elevation. Before the road is open to traffic, the joint filler shall be cut off ½ inch above the surface of the road.

As soon as a section of pavement has been finished as described, it shall be entirely covered with canvas so supported as not to touch the pavement. As soon as the concrete has sufficiently hardened to prevent pitting, the canvas may be removed, and the surface of the pavement shall be sprayed with water and shall be kept wet until the concrete has thoroughly hardened. When the concrete has set to an extent that the surface of the pavement will not be marred by men walking upon it, it shall be covered with not less than 2 inches of earth, or other suitable material, which covering shall be immediately wetted and shall be kept wet for at least 10 days. It shall be removed and disposed of before traffic is permitted upon the pavement.

The Contractor shall take proper and adequate precautions to keep all classes of traffic off the pavement until the concrete is thoroughly hardened, and in no case shall this period be less than 21 days after the concrete is placed.

61.8 62.8 63.8 64.8 64x.8 65.8 66.2 **Payment.**—The pavement to be paid for under these items shall include the quantity in square yards, measured in place, constructed within the limits shown on the Drawings or designated by the Engineer, including curbs if bult. The unit prices stipulated for these items shall include the cost of all work and of all material except cement and reinforcing steel, necessary for preparing subgrade and building the pavement as shown on the Drawings or specified, and maintaining it in good condition until the completion of the Contract.

Item 67
Guard-Rails

67.1 **Description.**—Where indicated on the Drawings or ordered by the Engineer, the Contractor shall furnish and erect wooden guard-rails of the type shown on the Drawings.

67.2 **Materials.**—Posts shall be of sound, seasoned red cedar, white oak, tamarack, chestnut, or other satisfactory wood, entirely stripped of bark or skin, not less than 6½ feet long, and not less than 6 inches in diameter at any section. Posts shall be straight, sloped on top, and notched for the side rails as shown on the Drawings. They shall be set plumb, not more than 8 feet apart between centers, and set not less than 3 feet into the ground, with the sides toward the highway on a true line or as directed. The lower part of each post, to a point about 3 feet from the top shall be charred as directed.

Rails shall be of seasoned spruce, shortleaf yellow pine or other satisfactory wood, surfaced on 4 sides, of a grade equal to that specified under Item 71, Timber and Lumber Miscellaneous, and of a length equal to twice the distance between adjoining posts, approximately 16 feet.

67.3 **Erection.**—Post-holes shall be excavated sufficiently large to properly admit the post and leave room for setting. Refilling shall be of proper material and thoroughly tamped. The top rail shall be set on a slope, and the side rail shall be notched into the post. Both rails shall be neatly joined and securely nailed, and shall show a true alignment when the guard-rail is completed.

67.4 **Painting.**—When the lumber is dry and weather conditions are suitable, the guard-rails shall be painted as follows: Before being assembled the notches in the posts, the tops of the posts, and all parts of the rails that will be inaccessible after erection shall be painted with two coats, and after erection the rails shall be given three coats, of best white lead and linseed oil.

67.5 Payment.—The quantity of guard-rail to be paid for under this item shall be the number of linear feet actually built in accordance with the Drawings and directions, as measured along the structure. The unit price stipulated under this item shall include the cost of furnishing and erecting all posts and rails, of excavating and refilling post holes, the cost of painting, charring, spikes, and nails, and all expense incidental to completing the work in a satisfactory manner.

Item 68

Wire Fences

68.1 Description.—Wire fences of the types shown on the Drawings and described herein shall be furnished and erected wherever ordered.

68.2 Materials.—In general, posts shall be of sound, seasoned red cedar, white oak, tamarack, chestnut, or other satisfactory wood, entirely stripped of bark or skin. They shall be reasonably straight and roughly roofed on top; and shall be set plumb and at the locations ordered. The lower part of each post, to a height which will be about 6 inches above the surface of the ground when set, shall be charred as directed. In general, posts shall be spaced about 16 feet apart except at corner posts or straining posts, at either side of gates, and at other places as required, where they shall be spaced about 8 feet apart as shown on the Drawings. Line posts shall be not less than 5 inches in diameter at any section, and shall be set into earth not less than 2½ feet, or into rock not less than 1½ feet. Straining and corner posts shall be not less than 8 inches in diameter at any section, and shall be set into earth not less than 3½ feet, or into rock not less than 2 feet, unless otherwise ordered. Other types of posts of equivalent durability, strength and appearance may be submitted for approval as substitutes for the wooden posts specified.

At corner and straining posts, at gates, and at other places required, wooden braces and No. 9 gage wire guys shall be furnished and placed as shown on the Drawings or directed.

The fencing shall consist of galvanized steel wires of the number, size and approximate spacing shown on the Drawings or described herein, and, unless otherwise shown on the Drawings, shall be equal in all respects to the Page fencing, made by the Page Woven Wire Co., having all line wires No. 7 gage, and all stays No. 9 gage, or to the fencing made by the American Steel & Wire Co., having all

wires No. 7 gage. Wire gage numbers used are those of the U. S. Steel Wire Gage, and the gage specified is that of the wire before galvanizing. Unless otherwise indicated on the Drawings, either type of fencing may be furnished, as the Contractor may elect.

The Contractor shall furnish and set in the fences, wherever required, gates of approved design, similar to that shown on the Drawings, with hinges and fastenings complete.

68.3 Erection.—Postholes shall be excavated sufficiently large to properly admit the post, and leave room for setting. Where rock is encountered, the posts shall be set in holes excavated by blasting or other satisfactory method, or shall be secured by other methods permitted or directed. Refilling shall be of proper material and thoroughly tamped. The fencing shall be attached to the posts by means of galvanized staples, or by other approved means. During erection the fencing shall be subjected to suitable tension, and when completed, shall be satisfactorily taut, true to line, and fully in conformity with the Drawings and with good practice.

68.4 Payment.—The quantity to be paid for under Item 68 shall be the number of linear feet of fence actually built in accordance with the Drawings or orders, as measured along the structure, but not including gate openings, the length of each of which shall be the distance between centers of gate posts. The price stipulated under this item shall include the cost of furnishing and erecting all posts, braces, wire guys and wire fencing, the cost of excavating and refilling post holes, of charring posts, and of hardware, and all expense incidental to completing the work in a satisfactory manner. But the cost of metal work required for gates, hinges and gate fastenings, shall be paid for under Item 82, Miscellaneous Cast Iron, Wrought Iron and Steel; and that of lumber required for gates, other than that required for gate posts, shall be paid for under Item 71, Timber and Lumber, Miscellaneous.

Note.—There is no Item 69.

Item 70

Protective Boom and Accessories

70.1 Description.—The Contractor shall furnish and place protective booms, including chains, bolts, and other accessories as shown on the Drawings or ordered.

70.2 **Lumber.**—Timber and lumber of various sizes shall be furnished and built to the shapes shown on the Drawings, to form the timber portion of the protective boom. All timber and lumber to be paid for under this item shall be spruce, Douglas fir, or other satisfactory wood, of a grade equal to that specified under Item 71, Timber and Lumber, Miscellaneous. When fairly wet, its weight shall not exceed 45 pounds per cubic foot. Before being assembled, and while dry, all timber and lumber shall be painted with two coats of best white lead and linseed oil, and a third coat shall be put on after erection and when danger of marring is past.

70.3 **Wrought Iron.**—Under this item wrought iron chains, bolts, steel plates, and other accessories required in the construction, or for the anchorages, of the protective boom shall be furnished and placed as shown on the Drawings or ordered. All wrought iron shall be of an acceptable quality for the purpose contemplated. The claims shall conform to the Standard Specifications for Iron and Steel Chain of Class B, Iron Chain, published in the 1915 Year Book of the American Society of Testing Materials.

70.4 **Payment.**—The quantity of timber and lumber to be paid for under this item shall include the number of thousand feet board measure actually placed in accordance with the Drawings or orders. Should any round timber be used it shall be measured for payment as square timber of the largest size, omitting fractions of an inch, which can be inscribed in the small end of the log. The unit price stipulated for this item shall include the cost of all labor and materials necessary for furnishing, working, painting and placing the protective boom, and all expense incidental thereto, except the cost of wrought iron and steel which will be paid for under Item 82, Miscellaneous Cast Iron, Wrought Iron and Steel.

Item 71

Timber and Lumber, Miscellaneous

71.1 **Description.**—Timber and lumber of various sizes not otherwise provided for may be ordered and shall be furnished by the Contractor, worked and built into place by him for drains, sills, platforms or grillages, and for other similar purposes.

It shall be of the grade known commercially as No. 1 or No. 1 Common, as specified in the standard rules for grading timber and lumber adopted by the Northern Pine Manufacturers Association, the Southern Pine Association, and the National Hardwood Lumber Association in effect January 1, 1916.

Unless noted specifically in the Drawings or Specifications, the Contractor will not be required to furnish any hardwood lumber under this item.

71.2 **Payment.**—The quantities of timber and lumber to be paid for under this item shall include the number of thousand feet board measure actually placed in accordance with the Drawings, Specifications and orders and not included under other items. Should any round timber be used it shall be estimated as square timber of the largest size, omitting fractions of an inch, which can be inscribed in the small end of the log. Any second-hand lumber which has been notched for previous use shall be estimated for payment as of the size of its minimum cross section. The unit price stipulated for this item shall include the cost of all bolts, spikes and other fastenings and of all other materials, and all expense incidental to furnishing, working and placing the timber and lumber satisfactorily.

No timber or lumber shall be paid for under this item which is not specifically ordered, and this item shall not be interpreted to include the lumber used for forms, molds, and centers for concrete or other masonry, for sheeting and bracing, for scaffolds or braces, for sluices or trestles, or for other temporary or construction purposes, the cost of which is to be included in the unit price stipulated for the work in connection with which it is used; unless the Engineer shall specifically order in writing that such material be permanently left in place, in which case it shall be paid for as provided under Item 89.

Items 72 and 72x

Timber Piles

72.1 **Description.**—The Contractor shall furnish and drive
72x.1 piles of the quality herein specified in the positions shown in the Drawings or ordered. Such piles shall be of the lengths prescribed by the Engineer, and for the purpose of determining the lengths to be required, test piles of lengths to be ordered, shall be driven at the times, locations, and to the depths required by the Engineer.

Item 72 shall include all such piles 20 feet, or less, in length.

Item 72x shall include all such piles more than 20 feet in length.

72.2 **Quality.**—Piles shall be of spruce or hard wood, and
72x.2 shall be cut from growing trees when the sap is down: they shall be close grained and solid, free from cracks, shakes, large or unsound knots, decay, or any other defects which

would impair their strength or durability. Piles shall be cut above the ground swell of trees, shall be uniformly tapering, and a straight line from center of butt to center of tip shall lie wholly within the pile. Before driving, all piles shall be peeled.

72.3 72x.3 **Size and Length.**—For lengths not exceeding 30 feet, piles shall have a diameter at tip of not less than 9 inches; for piles longer than 30 feet the minimum diameter shall be 8 inches. In all cases the diameter of the butt at the cut-off shall be at least 12 inches. Piles must be of such lengths as to insure sound wood, free from the effects of driving, when cut off at the required elevation. No splicing will be permitted.

72.4 72x.4 **Driving.**—It is expected that piles will be driven to the depths shown on the Drawings, but modification may be made by the Engineer in accordance with the conditions developed. A steam-hammer is preferred, but a drop-hammer may be used, provided the weight of the hammer and height of fall are satisfactory. Where directed, a water jet shall be used to assist in driving. The small end shall be pointed, and the butt end cut off square, as directed. Care shall be taken not to damage the piles by excessive hammering. If directed, a suitable cap or follower shall be used. All piles broken, split, or otherwise injured, and piles driven too low, out of position, or in any respect improperly driven shall be satisfactorily replaced at the Contractor's expense.

72.5 72x.5 **Cutting to Grade.**—Piles shall be cut off at the required elevations. Where timber caps or grillages are to be used care shall be taken to insure a level cut, free from sloping or curved surfaces, to the end that a smooth, level bearing shall be provided at the exact elevation.

72.6 72x.6 **Payment.**—The amount of piling to be included for payment under these items shall be the number of linear feet actually in place in accordance with the Drawings and directions, measured below the cut-off, and in addition, one quarter of the quantity measured above the cut-off, no allowance being made for piles that are damaged, broken, or otherwise unfit for use. Test piles when ordered, shall be paid for under these items when driven to the satisfaction of the Engineer. Payment for test piles shall be made for the full length ordered by the Engineer, whether cut off or not. The unit price stipulated for these items shall include the entire cost of all labor and materials necessary for furnishing, placing, and cutting off the piles in a satisfactory manner, and all expense incidental thereto.

Item 73

Wood Sheet Piling

73.1 Description.—The Contractor shall furnish and drive wood sheet piling of the quality herein specified, in the positions shown in the Drawings or ordered. Such piles shall be of the lengths prescribed by the Engineer, and for the purpose of determining the lengths to be required, test piles, of lengths to be prescribed, shall be driven at the times, locations, and to the depths required by the Engineer.

73.2 Materials.—Sheet piles shall be of spruce, or longleaf yellow pine, of a grade equal to that specified under Item 71, Timber and Lumber, Miscellaneous. Sheet piles shall be tongued and grooved, or splined and grooved, and of the dimensions shown on the Drawings or ordered, but shall not be less than 4 inches, nor more than 6 inches in thickness. Where 6-inch sheet piles are required, each pile shall consist of three 2-inch planks spiked or bolted together as shown on the Drawings.

73.3 Driving.—It is expected that sheet piles will be driven to the depths shown on the Drawings, but modifications may be made by the Engineer in accordance with the conditions developed. Where directed, sheet piles shall be driven by the aid of a water jet and with a suitable cap or follower. All piles broken, split, or otherwise injured, and piles driven too low, out of position, or in any respect improperly driven, shall be satisfactorily replaced at the Contractor's expense. Piles shall be sawed off at the required elevations, and the pile head after sawing shall be sound and level.

73.4 Payment.—The amount of sheet piling to be paid for under this item shall be the number of thousand feet board measure of sheet piling actually in place in accordance with the Drawings and directions, measured below the cut-off, and in addition, one quarter of the quantity measured above cut-off, no allowance being made for piles that are damaged, broken or otherwise unfit for use. Test piles, when ordered, shall be paid for under this item when driven to the satisfaction of the Engineer. Payment for test piles shall be made for the full length ordered by the Engineer, whether cut off or not. The unit price stipulated for this item shall include the entire cost of all labor and materials necessary for furnishing, placing and cutting off the piles in a satisfactory manner, and all expense incidental thereto.

Item 74

Steel Sheet Piling

74.1 Description.—Steel sheet piling of the lengths shown on the Drawings shall be furnished and driven by the Contractor. Test piles, of lengths to be prescribed, shall be driven at the times and locations and to the depths required by the Engineer.

74.2 Requirements.—Steel for sheet piling shall fulfill the requirements, and be subject to all tests for structural steel, given in the Standard Specifications for Structural Steel for Bridges, adopted by the American Society for Testing Materials, revised to 1915, and published in the 1915 Year Book of that Society. Steel sheet piles shall be of some standard make of integral rolled section, shall have a positive interlock capable of withstanding a pull of not less than 9500 pounds per linear inch, and shall be so designed as to permit a change in direction of at least 15 degrees either way at the joint. Unless otherwise specified on the Drawings, piles shall have a web thickness of not less than $\frac{3}{8}$ inch, and shall weigh not less than 35 pounds per square foot when interlocked. Where shown on the Drawings, corners shall be formed by the insertion of a special member. Each pile shall have a hole punched near one end for handling.

74.3 Tests.—Mill tests and inspection will be made under the supervision of the Engineer, but the Contractor shall, at his own expense, arrange for a testing machine at the mill or shop, and the test pieces for breaking, together with all facilities for conducting the prescribed tests.

74.4 Driving.—Sheet piles shall be carefully driven to line and to the required depths. Where necessary to procure the proper penetration, a water jet shall be used. The methods and equipment shall be such as not to injure the piles unnecessarily. For this purpose suitable drive caps shall be used. Unless otherwise permitted, a steam hammer shall be employed for driving. Should the use of drop hammer be allowed, the Contractor shall employ only operators who are skilled in work of this kind, and the weight of hammer and height of fall at all times shall be subject to the approval of the Engineer. Before driving, the piling shall be assembled in sections not less than 10 feet long, and no pile in any section shall be driven more than 5 feet lower than the general level of that section, nor shall the level of sheet piling in any section vary more than 5 feet from the general level of the adjacent section. To provide for this

method of procedure the hammer shall be properly offset from the leads, and other provisions made to permit ready movement of the pile driver. All piles which are damaged, and piles out of position, or in any respect improperly driven, shall be satisfactorily replaced at the Contractor's expense.

74.5 **Payment.**—The amount of steel sheet piling to be paid for under this item shall be the number of tons of 2000 pounds actually driven in accordance with the Drawings and Specifiactions. Test piles, when ordered, shall be paid for under this item, when driven to the satisfaction of the Engineer. Payment for test piles shall be made for the full length ordered. The unit price stipulated for this item shall include the entire cost of all labor and materials necessary for furnishing and driving the piles in a satisfactory manner, and all expense incidental thereto. If piles are required to be cut off, such work shall be paid for as Extra Work, under Section 0.19 of the Specifications.

Item 75

Furnishing Cast Iron Pipe

75.1 **Description.**—Cast iron pipe and specials to be furnished by the Contractor for sewer outlets, culverts, and for other purposes as shown on the Drawings or ordered, shall satisfy all requirements of the Standard Specifications for Cast Iron Pipe and Special Castings of the American Society for Testing Materials, as published in the 1915 Year Book of that Society.

75.2 **Payment.**—The pipe to be paid for under this item shall include the quantity in tons of 2000 pounds actually placed in the work in accordance with the Drawings and directions, as weighed for payment under the provisions of the specifications of the American Socity for Testing Materials referred to in Section 75.1.

The unit price stipulated for this item shall include the cost of furnishing straight bell and spigot pipe only. Special castings and flanged pipe, if any are required, will be paid for under Item 82, Miscellaneous Cast Iron, Wrought Iron and Steel. These unit prices shall include the cost of making tests, coating, transporting, and all other expense incidental to delivering the pipe in good condition at the site of the work.

Item 76

Laying Cast Iron Pipe

76.1 Description.—This item shall include the laying of cast iron pipe and special castings, as required by the Drawings or Specifications, or as prescribed by the Engineer.

Each length of pipe, unless otherwise permitted, shall be supported near each end by suitable wooden blocks and wedges of sound lumber. On grades, unless otherwise permitted, the pipe shall be laid with bells pointing up hill. The spigot ends of bell and spigot pipes shall be inserted into the bells to their full depths. Each joint space shall be of uniform width, and packed with clean, sound packing yarn, tightly driven, so as to leave sufficient space for the lead joint. The lead joint shall be run with one pouring, with the best quality of molten lead. After the joint has been run it shall be calked by competent mechanics with at least three calking tools of different widths, in such manner as to secure a watertight joint without overstraining the bells. After the joints are finished, care shall be taken to fill under the pipe with selected material so as to give the pipe a firm, even bearing along its entire length.

76.2 Payment.—The pipe-laying to be paid for under this item shall include the length of pipe, in linear feet, measured in the trench along the tops of the bells, actually laid in accordance with the requirements of the Drawings or Specifications, and the instructions of the Engineer.

The unit prices stipulated for this item shall include the cost of cutting, handling, and laying pipe and specials, labor and material for joints, testing if required, and all other expense incidental to laying the pipe and leaving it in satisfactory condition. These unit prices shall not include the cost of excavating or backfilling the trench, which will be paid for under another item.

Note.—The price bid under this item will be stated in terms of cents per inch of diameter per linear foot.

Item 77

Flood Gates

77.1 Description.—Under this item the Contractor shall furnish and set in place, in complete working order, flood gates of such sizes and types as may be required as a part of local improvements in towns and cities, at the outlets of sewers and storm water chan-

nels, on hydraulics, canals, tail-races and other artificial channels, at the places shown in the Drawings, or as ordered, to effectually prevent the ingress of flood waters. This item shall include all labor and material used in the complete mechanical assembling of, and all materials incorporated in, all detail parts, including gates, frames, guides, gate stems, gate stem brackets, operating stands or other hoisting devices, together with all anchor bolts, fittings, and any other parts or appurtenances required in connection therewith, in accordance with the Drawings, Specifications and instructions of the Engineer. The Contractor shall exercise especial care to obtain proper alignment of the various working parts, to securely embed all anchor bolts, and to make water-tight not only the gates themselves, but also the joints between the flanges of wall frames and the concrete or masonry.

77.2 **Cast Iron Flood Gates.**—Unless otherwise shown in the Drawings, or specifically ordered, cast iron flood gates shall be of the hand-operated, rising stem, sluice gate type, equipped with bronze mounted bearings and wedges, and operating in cast iron bronze-lined guides of lengths sufficient to properly hold the gate leaf when raised to full height. Sluice gates may be circular or rectangular, as may be required; they shall operate smoothly when under pressure and shall be water-tight when seated.

The Contractor shall furnish the Engineer with a statement of the make and type of gate which he proposes to supply, and when required, shall furnish a full set of working drawings sufficiently in advance of the installation of the gate to permit of proper provision being made for setting it in the concrete. Gates shall be of approved design, made by manufacturers of established reputation for this class of work, and shall be designed to safely withstand, and be water-tight under, heads not less than those called for.

In addition to factory inspection, gates shall be subject to inspection and tests by the Engineer after installation in order to determine their serviceability and water-tightness; and any defects found to exist or which may develop before the completion of the Contract shall be made good by the Contractor without cost to the District.

All cast iron used in the construction of flood gates shall be strong, tough gray iron of good quality, free from cold-shuts or injurious blow holes, porous places or cracks.

All bronze used shall be of homogeneous character and equal in strength and non-corroding properties to Parson's manganese bronze. Cold-rolled, cold-finished or cold-straightened bronze will not be accepted.

77.3 Steel Flood Gates.—The Contractor shall provide where required for local flood control works, in or near cities and villages, sluice gates built up of structural steel shapes in accordance with the designs and instructions of the Engineer. All structural steel used shall be open-hearth steel conforming to the Standard Specifications for Structural Steel for Bridges, as published in the 1915 Year Book of the American Society for Testing Materials.

Guides for steel gates shall be of cast iron, or of structural steel as required and shall be set truly straight and parallel.

Wherever possible, rivets shall be machine driven at the shop. All rivet work shall be punched accurately with holes 1/16 inch larger than the size of the rivet, and when the sections are assembled the holes must be truly opposite. No drifting, resulting in distortion of the metal, will be allowed; if any hole must be enlarged to admit a rivet, it must be done by reaming. All holes for field rivets shall be accurately punched, and fitted by reaming while the connecting parts are temporarily put together. Rivet heads must be of hemispherical shape and of uniform size for the same size rivets throughout the work, and concentric with the rivet hole. All rivets when driven must completely fill the holes; the heads must be in full contact with the surface, or countersunk when so required.

Where rollers are required these shall be of cast steel, true to pattern, of workmanlike finish, and free from injurious blowholes and defects. They shall conform to the Standard Specifications for Class B medium steel castings, as published in the 1915 Year Book of the American Society for Testing Materials.

Cast iron and bronze fittings for steel gates shall conform to the specifications for cast iron and bronze under Section 77.2.

77.4 Gate Stems.—Gate stems shall be of the rack gear or the screw type, as required.

Screw stems shall consist of cold rolled steel shafting with square cut threads. When the threaded portion is subject to submergence it shall be of bronze of quality equal to that of Parson's manganese bronze. Stems shall be in sections of approved lengths, fastened together by means of strong couplings of approved pattern, and shall be supported by approved wall or guide brackets at intervals not exceeding 10 feet. Such brackets shall be bronze lined and adjustable.

Stems equipped with racks, to be operated by pinions on hoisting devices, shall be built up of approved structural steel shapes so

designed as to prevent buckling when in compression. The racks shall be bolted in sections to the gate stems, and shall be of cast iron or cast steel, as may be required. Such stems shall be held in place by suitable backrollers mounted on the hoisting device.

77.5 Operating Stands and Hoisting Devices.—With each sluice gate the Contractor shall furnish an operating stand or hoisting device of approved type, so designed as to enable one man to raise or lower the gate under the full head without excessive exertion and with reasonable speed. Operating stands shall be ball bearing and equipped with bronze nuts of quality equal to that of Parson's manganese bronze, and shall be operated by means of suitable cranks or wheels. Hoisting devices for engaging gate stems equipped with racks shall be operated either by means of levers, or, if geared, by means of suitable cranks.

Operating stands and hoisting devices shall be equipped with a pawl, brake, or other suitable device to prevent retrograde action.

Anchor bolts and base plates of operating stands or hoisting devices shall be strong enough to withstand an upward thrust at least equal to the full force which the mechanism is capable of developing.

When required, gears and the threaded portions of stems shall be incased in cast iron hoods or covers, proof against intrusion of rain water or dust.

77.6 Tide Gates.—Tide gates, or tide flap valves, shall be furnished under this item, if required. They shall be of cast iron, of approved design, and shall be furnished by some manufacturer of established reputation for this class of work. Materials used in their construction shall be of quality equal to that specified under Section 77.2.

77.7 Painting.—All metal work before leaving the shop, shall be thoroughly cleaned from all loose scale and rust, and all parts which are not to be embedded in concrete shall be painted with one good coat of approved paint. After erection two more coats of a paint, to be specified by the Engineer, shall be thoroughly and evenly applied, provided that no such painting shall be done until after inspection. All bolts, nuts, tapped holes, pins, bored pinholes and all machined surfaces shall be coated with white lead and tallow or other rust-preventing lubricating compound satisfactory to the Engineer.

77.8 Payment.—The quantity to be paid for under this item shall be the weight in pounds of all gates and accessories furnished and placed in accordance with the Drawings and Specifications and the instructions of the Engineer. The unit price stipulated for this item shall include the cost of furnishing and placing the gates and appurtenances as directed, and of all labor and materials incidental thereto, including their maintenance during construction, so that they will be left in good operating condition at the close of the Contract.

Item 78

Steel Highway Bridges

78.1 Description.—Steel highway bridges of approved design shall be furnished and erected wherever shown on the Drawings. These bridges shall have a clear width of roadway of 18 feet, and the spans, as measured between centers of bearings of trusses, girders, or longitudinal beams, shall be as shown on the Drawings.

Unless otherwise explicitly prescribed, all materials to be furnished and all work to be done under this item shall conform to the requirements of the General Specifications for Steel Highway Bridges, dated 1911, of the State Highway Department, Columbus, Ohio, in so far as such specifications apply to steel bridge superstructures.

Wherever the words State Highway Commissioner, State Highway Commissioner or his Deputy, State Highway Department, Highway Department, County Surveyor, or County Commissioners occur in the above mentioned specifications, such words shall be understood to mean the Chief Engineer of The Miami Conservancy District, or his authorized agent, except in Article 17 in which case such names as may be required shall be substituted for the names specified therein. Article 63 of the above mentioned specifications shall be understood to be omitted.

All bridges required under this item shall be of the class designated in the above mentioned specifications as **Class C—Bridges for country roads with light electric cars or heavy highway traffic**; but none of them will carry electric cars. Unless otherwise shown on the Drawings all bridge floors shall consist of creosoted wood blocks laid on creosoted planks.

The Contractor shall furnish the Engineer with stress sheets showing the maximum stress to which the members are to be subjected, based upon the loading specified, and computed in accordance with the provisions of the Highway Department specifications referred to herein.

78.2 **Creosoted Wood Block Floors.**—All timber entering into the construction of the floor system shall be equal to creosoted long-leaf yellow pine. The nailing pieces shall be bolted to the metal joists, or prevented from sliding by other approved means. The sub-planking shall have a commercial thickness of not less than 3 inches, and shall be securely fastened in place by approved means. The retaining pieces, scupper blocks and wheel guards shall be fastened to the steel joists by means of one ¾-inch hook bolt at each end of each piece of the wheel guard, and at each intermediate scupper block, or by other approved means. The scupper blocks shall be placed at intervals of not more than 4 feet, and shall be rigidly fastened to the retaining pieces by means of wire spikes in addition to the bolts above described. Standard-sized washers shall be used between the heads or nuts of bolts and lag screws, and the faces of timbers. The depth of the wood block paving shall be 3 inches, and the pavement shall be crowned 1½ inches, or as directed. Other requirements as to the floor system, are covered in the Highway Department specifications referred to heretofore.

78.3 **Payment.**—The lump sum price stipulated under this item shall include the cost of all labor and materials necessary for furnishing, erecting and painting, the bridge super-structure complete, in accordance with the Drawings and Specifications, together with all floor timbers, floors, pavements, guards, and other appurtenances, but not including the sub-structures and bridge approaches.

Note.—There are no Items 79 or 80.

Item 81

Raising, Removing, and Re-erecting Existing Steel Bridges

81.1 **Description.**—Wherever so shown on the Drawings, existing steel bridges shall be raised, removed, transported to the points designated, and re-erected, as indicated on the Drawings, and described herein. The work to be done under this item shall include all false work, staging, metal work, repairs to superstructure, including floors and pavements, and all other labor, materials and incidentals necessary to complete the work contemplated and to leave the bridges, at the termination of this Contract, in as satisfactory condition as they were when the work under this item was begun, but it shall not include any materials or labor required for constructing or reconstructing the sub-structure or approaches.

81.2 Payment.—For all labor, materials and incidentals required to raise, remove, transport and re-erect existing steel bridges, as described herein and as indicated on the Drawings, the Contractor shall receive the lump sum stipulated under this item; but no payment will be made in progress estimates for the raising, transporting and re-erecting of any bridge until the work on such bridge shall have been completed.

Item 82

Miscellaneous Cast Iron, Wrought Iron, and Steel

82.1 Description.—Under this item, the Contractor shall furnish miscellaneous cast iron, wrought iron, and steel, which is not included under other items, in the quantity and of the dimensions shown on the Drawings, or otherwise required, and shall place it in the work as directed. This item shall include all special pipe castings, and flanged pipe; cast iron frames, gratings for manholes and catch basins; pipe and fittings for grouting and drainage operations, weeper drains and hand rails; anchor bolts and tie rods or truss rods; ladders and steel plates; chains and accessories for protective boom; and other similar material. All wrought iron and steel furnished under this item shall be of acceptable quality and finish for the purpose contemplated. All cast iron shall be strong, tough and even grained and all castings shall be true to pattern, free from blow-holes, porous places, shrinkage or other cracks, and in every way acceptable.

82.2 Cleaning and Painting.—Unless otherwise specified, castings shall be thoroughly snagged and cleaned, and before rusting has begun, dipped in tar, or if permitted, painted with one coat of approved varnish paint, another coat to be applied after erection and when danger of marring is past. Other metal surfaces shall be satisfactorily cleaned and coated or painted as directed. Metal work which is to be painted shall be given, when clean, a good shop coat of red lead or carbon paint, and after erection, when directed, at least two good coats of best carbon paint or such other paint as may be ordered, colored as required. No painting shall be done on damp or dirty surfaces.

82.3 **Payment.**—The quantity of cast iron, wrought iron and steel to be paid for under this item shall be the number of pounds actually placed in the work in accordance with the Drawings and requirements. The price stipulated for this item shall include the cost of furnishing, cleaning, painting, as directed, and placing,— except placing special pipe castings and flanged pipe, which will be paid for under another item,—and all materials and expense incidental thereto. No cast iron, wrought iron or steel, which is not specifically ordered, shall be paid for under this item, and this item shall not be held to include the metal used for covering forms, for properly spacing or supporting the sides of forms or moulds, or for supporting or securing steel reinforcing; neither shall it be held to include spikes, bolts, and other metal used in timber structures except when otherwise specified, nor any metal which by reasonable inference is necessary for doing work or furnishing material covered by other items.

Item 83

Bronze

83.1 **Description.**—Under this item the Contractor shall furnish and place bearing plates of Monel Metal or Manganese Bronze in hinged arches of discharge conduits, as shown on the Drawings. Monel metal or bronze shall have an ultimate tensile strength of not less than 65,000 pounds per square inch, a yield point of not less than 32,000 pounds per square inch, and an elongation of not less than 25 per cent in two inches. No metal shall be manufactured until methods of manufacture have received approval. Cold-rolled, cold-finished, or cold-straightened material will not be accepted.

83.2 **Payment.**—The quantity of bronze to be paid for shall be the number of pounds actually placed as ordered. The price stipulated in this item shall include the cost of all materials, fabricating, placing, and all expense incidental thereto.

Item 84

Wire Rope

84.1 **Description.**—Wire rope may be required as a part of the permanent installation of flexible slab revetment. Such wire rope shall be of the size and quality prescribed on the Drawings, and shall be furnished and placed under this item, complete with fastenings as shown.

84.2 Payment.—The quantity of wire rope to be paid for under this item shall be the number of pounds, including the fastenings, actually placed in the work in accordance with the Drawings and Specifications. The unit price shall include the cost of furnishing and placing the rope and fastenings as prescribed, and all expense incidental thereto. In determining quantities, except as the Engineer may require test weighing on scales, commercial unit weights shall be used.

Item 85

Cleaning Up

85.1 Work to be Done.—Before the completion of the work included in this Contract the Contractor shall completely remove and satisfactorily dispose of all temporary works, to the extent directed. He shall tear down and dispose of all temporary buildings, trestles or stagings constructed by him; shall remove or grade to the extent directed all embankments or cofferdams made for construction purposes; shall satisfactorily fill excavations as directed; shall remove all plant and equipment; shall remove the rails and ties and other woodwork of any railway built by him; shall satisfactorily dispose of all rubbish resulting from the operations under this Contract, and shall do all work necessary to restore the territory embraced within the zone of his operations to a condition at least as sightly as at the beginning of work under this Contract. Surface dressing and grassing shall be placed, if directed, to cover unsightly areas, and, where ordered, shall be paid for under Item 38.

85.2 Payment.—For all labor, materials and miscellaneous work required to leave the grounds in an acceptable condition, with the exception of surface dressing and grassing, which shall be paid for under Item 38, the Contractor shall receive the lump sum stipulated for this item, which shall be included for payment in the final estimate.

Note.—There are no Items 86, 87 or 88.

Item 89

Sheeting Left in Place

89.1 Description.—This item shall include all sheeting or sheet piling placed by the Contractor as an incidental to work under some other item or items of the Contract, and afterwards left in place by written order of the Engineer. This item shall not include sheet piling driven under Item 73, full payment for which is provided under that item.

89.2 Payment.—The quantity of sheeting to be paid for under this item shall be the number of thousand feet board measure left in place, and included under this item, by written orders of the Engineer. Such sheeting will be paid for at the rate of $15.00 per thousand feet board measure, unless a lower unit price is submitted in the Proposal, and named in the Agreement. This unit price shall include the cost of all bolts, spikes, nails and other materials entering into the construction of such sheeting or sheet piling, and shall be in full settlement for all expense incidental thereto.

Item 90

Extra Work

90.1 Description.—This item shall include all Extra Work performed in connection with this Contract, as provided for under Section 0.19 of the Specifications.

90.2 Payment.—Payment for work done under this item shall be the actual necessary cost plus 15 per cent, as prescribed in Section 0.19 of the Specifications, entitled Extra Work.

PART VI

ESTIMATES OF QUANTITIES AND COST

PART VI

ESTIMATES OF QUANTITIES AND COST

In the following pages are tabulations of estimates of quantities and cost of the work required in the prosecution and completion of the Plan.

ARRANGEMENT OF ESTIMATES

The estimates of quantities are grouped under main headings covering work that might naturally be included in one contract, or work that is included in a natural division because of geographical location; as, Germantown Dam and Appurtenances, Local Flood Protection at Troy, etc. These main headings are subdivided according to structures, features, or sections; and the kinds of work to be done to complete each structure or feature are listed separately under that sub-heading, together with the numerical designation of the contract item under which each kind of work falls.

The estimates of cost are grouped under main headings covering all work necessary to complete a definite principal part of the flood control system; as, Dams and Appurtenances, Roads and Bridges, etc. These main headings are subdivided according to contract items which are brought together from the estimates of quantities and listed in numerical order.

Table 1.—Estimate of Quantities—Germantown Retarding Basin—Dam and Appurtenances

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Stream Control at Dam	Item	Estimated Quantity
Risk, damage, etc., and 3500 cu. yds. of embankment outside of dam, not to be paid for as embankment	1	1 job
Cleaning up (1600 cu. yds. of excavation in stream control dikes)	85	1 job
Cut-off Trench at Dam		
Earth excavation, Class 1, placed in dam	6	10,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	17,000 " "
Mixed excavation, Class 2	*7	2,000 " "
Mixed excavation, Class 2, below mean low water	*7a	1,000 " "
Rock excavation, Class 3	*8	1,000 " "
Rock excavation, Class 3, below mean low water	*8a	500 " "
Wood sheet piling	73	30 M.ft.B.M.
Steel sheet piling	74	90 tons
Main Dam		
Clearing and grubbing	2	14 acres
Excavation, soil stripping used in dam	5	20,000 cu. yds.
Excavation, Class 1, for minor drainage systems	16	1,600 " "
Embankment, Class A, hydraulic fill	31	647,000 " "
Embankment, Class B, semi-hydraulic fill	32	187,000 " "
Embankment, Class C, rolled fill	33	10,000 " "
Surface dressing and grassing	38	21,000 " "
Furnishing vitrified pipe	55	5,000 lin. ft.
Furnishing vitrified pipe specials	55	10 pieces
Laying vitrified pipe	56	5,020 lin. ft.
Gutter paving	59	900 sq. yds.
Cleaning up	85	1 job
Spillway		
Earth excavation, Class 1, placed in dam	13	68,000 cu. yds.
Mixed excavation, Class 2	*14	300 " "
Rock excavation, Class 3	15	4,500 " "
Mixed excavation, Class 2, for minor drainage systems	*17	500 " "
Rock excavation, Class 3, for same	*18	200 " "
Drilling foundations or masonry	*53	330 lin. ft.
Grouting foundations or masonry	*54	60 cu. yds.
Miscellaneous cast iron, wrought iron and steel (grouting pipe)	*82	2,000 lbs.

Table 1.—Estimate of Quantities—Germantown Retarding Basin—Dam and Appurtenances—(Continued)

Spillway—(Continued)	Item	Estimated Quantity
Concrete in weir	41	1,100 cu. yds.
Concrete in side walls	41	2,350 " "
Concrete in paving and floors	43	1,150 " "
Cement	50	8,000 bbls.
Backfilling around structures	37	3,300 cu. yds.
Embankment, Class F, miscellaneous	*36	1,700 " "
Cleaning up	85	1 job
Outlet Works		
Earth excavation, Class 1, placed in dam	13	67,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	13a	5,500 " "
Mixed excavation, Class 2	*14	1,700 " "
Mixed excavation, Class 2, below mean low water	*14a	1,000 " "
Rock excavation, Class 3	15	9,500 " "
Rock excavation, Class 3, below mean low water	15a	12,500 " "
Mixed excavation, Class 2, for minor drainage systems	*17	500 " "
Rock excavation, Class 3, for minor drainage systems	*18	300 " "
Earth excavation, Class 1, miscellaneous	*28	2,000 " "
Mixed excavation, Class 2, miscellaneous	*29	1,000 " "
Rock excavation, Class 3, miscellaneous	30	500 " "
Concrete in side and head walls of entrance and outlet	41	4,180 " "
Concrete in arches of conduits	41	2,730 " "
Concrete in inverts of conduits	41	210 " "
Concrete in collars of conduits	41	470 " "
Concrete in side and head walls of entrance and outlet, below mean low water	41a	2,810 " "
Concrete in inverts of conduits below mean low water	41a	1,530 " "
Concrete in collars of conduits below mean low water	41a	260 " "
Concrete in conduit linings	42	1,400 " "
Concrete in paving and floors, below mean low water	43a	2,450 " "
Cement	50	29,000 bbls.
Reinforcing steel	51	229,000 lbs.
Vitrified brick lining	52	252 cu. yds.
Backfilling around structures	37	12,200 " "
Embankment, Class F, miscellaneous	*36	3,300 " "
Furnishing vitrified pipe	55	1,700 lin. ft.
Furnishing vitrified pipe specials	55	20 pieces
Laying vitrified pipe	56	1,740 lin. ft.
Protective boom and accessories, lumber	70	17 M.ft.B.M.

Table 1.—Estimate of Quantities—Germantown Retarding Basin—Dam and Appurtenances—(Continued)

Outlet Works—(Continued)	Item	Estimated Quantity
Protective boom and accessories, concrete	41	430 cu. yds.
Protective boom and accessories, concrete below mean low water	41a	40 " "
Protective boom and accessories, miscellaneous cast iron, wrought iron, and steel	82	20,000 lbs.
Protective boom and accessories, reinforcing steel	51	21,000 "
Drilling foundations or masonry	*53	670 lin. ft.
Grouting foundations or masonry	*54	140 cu. yds.
Miscellaneous cast iron, wrought iron and steel (grouting pipe)	*82	4,000 lbs.
Dry rubble paving	57	700 cu. yds.
Riprap	58	2,300 " "
Crushed rock or gravel	*60	1,000 " "
Timber and lumber, miscellaneous	*71	10 M.ft.B.M.
Timber piles less than 20 feet long	*72	1,000 lin. ft.
Timber piles more than 20 feet long	*72x	1,000 " "
Bronze	83	30,000 lbs.
Cleaning up	85	1 job

Table 2.—Estimate of Quantities—Germantown Retarding Basin—Roads and Bridges

	Item	Estimated Quantity
Road No. 1		
Clearing and grubbing	2	1.5 acres
Grading		
Excavation from cut, Class 1	19	7,400 cu. yds.
Excavation from cut, Class 2	20	400 " "
Excavation from cut, Class 3	21	200 " "
Culverts		
Two 18-inch vitrified pipe culverts		
Excavation, Class 1	19	50 cu. yds.
Backfilling	37	20 " "
Concrete	46	20 " "
Cement	50	35 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	70 lin. ft.
Four 12-inch vitrified pipe culverts		
Excavation, Class 1	19	50 cu. yds.
Backfilling	37	30 " "
Concrete	46	20 " "
Cement	50	30 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	100 lin. ft.
Iron pipe culverts	82	900 lbs.
Road Surfacing		
Unrolled gravel	60	1,300 cu. yds.
Guard Rails	67	2,500 lin. ft.
Wire Fences		
Fence	68	13,800 " "
Miscellaneous lumber	71	0.2 M.ft.B.M.
Miscellaneous iron and steel	82	900 lbs.
Steel Bridges		
Superstructure	78	One 66-ft. span
Road No. 2		
Clearing and grubbing	2	0.5 acres
Grading		
Excavation from borrow, Class 1	19	20,550 cu. yds.
Excavation from borrow, Class 2	20	2,200 " "
Culverts		
One 3 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	50 cu. yds.
Backfilling	37	20 " "
Concrete	46	30 " "
Cement	50	50 bbls.
Reinforcing steel	51	2,000 lbs.
Road Surfacing		
Unrolled gravel	60	200 cu. yds.
Guard Rails	67	1,900 lin. ft.
Wire Fences	68	1,600 " "

Table 3.—Estimate of Quantities—Englewood Retarding Basin—Dam and Appurtenances

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Stream Control at Dam	Item	Estimated Quantity
Risk, damage, etc., and 1,300 cu. yds. of embankment outside of dam, not to be paid for as embankment	1	1 job
Earth excavation, Class 1, above mean low water, placed in dam	6	17,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	14,700 " "
Riprap placed	58	15,000 " "
Riprap removed, Class 1, above mean low water, within limits of dam	6	6,700 " "
Riprap removed, Class 1, below mean low water, within limits of dam	6a	7,500 " "
Cleaning up (23,800 cu. yds. of excavation in stream control dikes)	85	1 job
Cut-off Trench at Dam		
Earth excavation, Class 1, above mean low water, placed in dam	6	91,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	17,300 " "
Mixed excavation, Class 2, above mean low water	*7	10,000 " "
Mixed excavation, Class 2, below mean low water	*7a	10,000 " "
Rock excavation, Class 3, above mean low water	*8	5,000 " "
Rock excavation, Class 3, below mean low water	*8a	1,000 " "
Steel sheet piling	*74	380 tons
Wood sheet piling	*73	140 M.ft.B.M.
Main Dam		
Clearing and grubbing	2	3 acres
Removal of buildings	3	1 job
Soil stripping used in dam	5	100,000 cu. yds.
Earth excavation, Class 1, for minor drainage systems	16	3,500 " "
Embankment, Class A, hydraulic fill	31	3,500,000 " "
Embankment, Class B, semi-hydraulic fill	32	400,000 " "
Embankment, Class C, rolled fill	33	18,000 " "
Surface dressing and grassing	38	80,000 " "
Furnishing vitrified pipe	55	22,000 lin. ft.
Furnishing vitrified pipe specials	55	10 pieces
Laying vitrified pipe	56	22,020 lin. ft.
Gutter paving	59	3,000 sq. yds.
Cleaning up	85	1 job

Table 3.—Estimate of Quantities—Englewood Retarding Basin—Dam and Appurtenances—(Continued)

	Item	Estimated Quantity
Spillway		
Clearing and grubbing	2	2 acres
Earth excavation, Class 1, above mean low water, placed in dam	13	133,000 cu. yds.
Rock excavation, Class 3, above mean low water	15	15,000 " "
Mixed excavation, Class 2, for minor drainage systems	*17	1,000 " "
Rock excavation, Class 3, for minor drainage systems	*18	500 " "
Earth excavation, Class 1, miscellaneous	*28	3,000 " "
Mixed excavation, Class 2, miscellaneous	*29	2,000 " "
Rock excavation, Class 3, miscellaneous	*30	500 " "
Embankment, Class F, miscellaneous	*36	20,000 " "
Concrete in weir above mean low water	41	4,440 " "
Concrete in side walls above mean low water	41	11,860 " "
Concrete in floor paving above mean low water	43	1,500 " "
Cement	50	28,000 bbls.
Backfilling around structures	37	10,000 cu. yds.
Surface dressing and grassing	38	2,000 " "
Drilling foundations or masonry	*53	5,000 lin. ft.
Grouting foundations or masonry	*54	1,000 cu. yds.
Miscellaneous cast iron, wrought iron and steel (grouting pipe)	*82	30,000 lbs.
Furnishing vitrified pipe	55	1,000 lin. ft.
Furnishing vitrified pipe specials	55	40 pieces
Laying vitrified pipe	56	1,080 lin. ft.
Dry rubble paving	57	200 cu. yds.
Riprap	58	550 " "
Crushed stone or gravel	*60	500 " "
Cleaning up	85	1 job
Outlet Works		
Earth excavation, Class 1, above mean low water, placed in dam	13	23,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	13a	3,500 " "
Mixed excavation, Class 2, above mean low water	14	20,000 " "
Mixed excavation, Class 2, below mean low water	14a	17,000 " "
Rock excavation, Class 3, below mean low water	*15a	3,000 " "
Mixed excavation, Class 2, for minor drainage systems	*17	1,000 " "
Rock excavation, Class 3, for minor drainage systems	*18	500 " "
Earth excavation, Class 1, miscellaneous	*28	2,000 " "
Mixed excavation, Class 2, miscellaneous	*29	1,000 " "
Rock excavation, Class 3, miscellaneous	*30	500 " "
Concrete in side and head walls, entrance and outlet above mean low water	41	3,420 " "

Table 3.—Estimate of Quantities—Englewood Retarding Basin—Dam and Appurtenances—(Continued)

Outlet Works—(Continued)	Item	Estimated Quantity
Concrete in arches of conduits above mean low water	41	5,620 " "
Concrete in inverts of conduits above mean low water	41	320 " "
Concrete in collars of conduits above mean low water	41	750 " "
Concrete in side and head walls, entrance and outlet below mean low water	41a	1,710 " "
Concrete in arches of conduits below mean low water	41a	0 " "
Concrete in inverts of conduits below mean low water	41a	2,780 " "
Concrete in collars of conduits below mean low water	41a	410 " "
Concrete in conduit linings	42	2,100 " "
Concrete in floor of entrance and outlet below mean low water	43a	2,500 " "
Cement	50	34,000 bbls.
Reinforcing steel in conduit arches	51	450,000 lbs.
Vitrified brick lining	52	392 cu. yds.
Protective boom and accessories, concrete in piers above mean low water	41	860 " "
Protective boom and accessories, concrete in piers below mean low water	41a	330 " "
Protective boom and accessories, lumber	70	30 M.ft.B.M.
Protective boom and accessories, miscellaneous cast iron, wrought iron and steel	82	20,000 lbs.
Protective boom and accessories, reinforcing steel	51	100,000 "
Embankment, Class F, miscellaneous	*36	10,000 cu. yds.
Backfilling around structures	37	10,000 " "
Drilling foundations or masonry	*53	5,000 lin. ft.
Grouting foundations or masonry	*54	1,000 cu. yds.
Miscellaneous cast iron, wrought iron and steel (grouting pipe)	*82	30,000 lbs.
Furnishing vitrified pipe	55	1,000 lin. ft.
Laying vitrified pipe	56	1,000 " "
Dry rubble paving	57	1,600 cu. yds.
Riprap	58	3,450 " "
Crushed stone or gravel	*60	500 " "
Timber and lumber, miscellaneous	*71	20 M.ft.B.M.
Timber piles	*72	3,000 lin. ft.
Timber piles over 20 feet long	*72x	2,000 " "
Bronze	83	33,000 lbs.
Cleaning up	85	1 job

Table 4.—Estimate of Quantities—Englewood Retarding Basin—Roads and Bridges

	Item	Estimated Quantity
Road No. 3		
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	900 cu. yds.
Excavation from cut, Class 2	20	800 " "
Excavation from cut, Class 3	21	1,700 " "
Road Surfacing		
Waterbound macadam	62	1,500 sq. yds.
Road No. 4		
Clearing and grubbing	2	1 acre
Grading		
Excavation from cut, Class 1	19	1,800 cu. yds.
Excavation from cut, Class 2	20	500 " "
Excavation from cut, Class 3	21	600 " "
Excavation from borrow, Class 1	19	1,780 " "
Culverts		
Two 18-inch vitrified pipe culverts		
Excavation, Class 1	19	20 " "
Backfilling	37	10 " "
Concrete	46	20 " "
Cement	50	30 bbls.
Reinforcing steel	51	150 lbs.
Vitrified pipe	55	70 lin. ft.
Iron pipe culverts	82	600 lbs.
Paving		
Rolled gravel	61	14,800 sq. yds.
Guard Rails	67	8,900 lin. ft.
Wire Fences		
Fence	68	7,600 " "
Miscellaneous lumber	71	0.1 M.ft.B.M.
Miscellaneous iron and steel	82	600 lbs.
Steel Bridges		
Substructures		
Excavation, Class 1	22	150 cu. yds.
Excavation, Class 2	23	40 " "
Excavation, Class 3	24	20 " "
Backfilling	37	350 " "
Concrete	41	300 " "
Cement	50	480 bbls.
Reinforcing steel	51	3,300 lbs.
Superstructure	78	One 117-ft. span
Superstructure	78	One 30-ft. span
Pipe railing	82	1,000 lbs.

Table 4.—Estimate of Quantities—Englewood Retarding Basin—Roads and Bridges—(Continued)

Road No. 5	Item	Estimated Quantity
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	1,880 cu. yds.
Excavation from borrow, Class 1	19	500 " "
Excavation from cut, Class 2	20	200 " "
Excavation from cut, Class 3	21	100 " "
Culverts		
Two 12-inch vitrified pipe culverts		
Excavation, Class 1	19	20 " "
Backfilling	37	10 " "
Concrete	46	10 " "
Cement	50	15 bbls.
Reinforcing steel	51	100 lbs.
Vitrified pipe	55	60 lin. ft.
Iron pipe culverts	82	450 lbs.
Road Surfacing		
Unrolled gravel	60	560 cu. yds.
Wire Fences		
Fence	68	7,000 lin. ft.
Miscellaneous lumber	71	0.1 M.ft.B.M.
Miscellaneous iron and steel	82	430 lbs.
Road No. 6		
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from borrow, Class 1	19	208,000 cu. yds.
Culverts		
One 3 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	50 " "
Backfilling	37	40 " "
Concrete	46	40 " "
Cement	50	70 bbls.
Reinforcing steel	51	2,600 lbs.
One 6 ft. x 4 ft. concrete box culvert		
Excavation, Class 1	19	150 cu. yds.
Backfilling	37	80 " "
Concrete	46	90 " "
Cement	50	160 bbls.
Reinforcing steel	51	6,600 lbs.
Iron pipe culverts	82	900 "
Road Surfacing		
Unrolled gravel	60	560 cu. yds.
Guard Rails	67	5,700 lin. ft.
Wire Fences		
Fence	68	5,800 " "
Miscellaneous iron and steel	82	900 lbs.

Table 4.—Estimate of Quantities—Englewood Retarding Basin—Roads and Bridges—(Continued)

Road No. 6—(Continued)	Item	Estimated Quantity
Steel Bridge		
Substructure		
Excavation, Class 1	22	1,600 cu. yds.
Excavation, Class 2	23	200 " "
Excavation, Class 3	24	400 " "
Excavation, Class 1	22a	500 " "
Excavation, Class 2	23a	100 " "
Excavation, Class 3	24a	40 " "
Backfilling	37	1,300 " "
Concrete	41	1,100 " "
Concrete	41a	500 " "
Cement	50	2,400 bbls.
Reinforcing steel	51	60,000 lbs.
Timber piles	72	1,600 lin. ft.
Moving and raising existing superstructure	81	Two 119-ft. spans
Riprap	58	200 cu. yds.
Road No. 7		
Clearing and grubbing	2	1 acre
Grading		
Excavation from cut, Class 1	19	6,400 cu. yds.
Excavation from borrow, Class 1	19	26,500 " "
Excavation from cut, Class 2	20	700 " "
Excavation from cut, Class 3	21	300 " "
Culverts		
One 3 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	40 " "
Backfilling	37	20 " "
Concrete	46	40 " "
Cement	50	70 bbls.
Reinforcing steel	51	2,700 lbs.
Four 12-inch vitrified pipe culverts		
Excavation, Class 1	19	40 cu. yds.
Backfilling	37	20 " "
Concrete	46	20 " "
Cement	50	30 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	120 lin. ft.
One 18-inch vitrified pipe culvert		
Excavation, Class 1	19	20 cu. yds.
Backfilling	37	10 " "
Concrete	46	10 " "
Cement	50	20 bbls.
Reinforcing steel	51	100 lbs.
Vitrified pipe	55	40 lin. ft.
Iron pipe culverts	82	600 lbs.
Road Surfacing		
Unrolled gravel	60	1,100 cu. yds.
Guard Rails	67	2,200 lin. ft.

Table 4.—Estimate of Quantities—Englewood Retarding Basin—Roads and Bridges—(Continued)

Road No. 7—(Continued)

	Item	Estimated Quantity
Wire Fences		
Fence	68	9,400 lin. ft.
Miscellaneous lumber	71	0.2 M.ft.B.M.
Miscellaneous iron and steel	82	600 lbs.
Steel Bridge over Brush Creek		
Substructure		
Excavation, Class 1	22	400 cu. yds.
Excavation, Class 2	23	100 " "
Excavation, Class 3	24	100 " "
Backfilling	37	400 " "
Concrete	41	250 " "
Cement	50	430 bbls.
Reinforcing steel	51	17,500 lbs.
Moving and raising existing superstructure	81	One 48-ft. span
Steel Bridge over Stillwater River		
Substructure		
Excavation, Class 1	22	400 cu. yds.
Excavation, Class 2	23	100 " "
Excavation, Class 3	24	260 " "
Excavation, Class 1	22a	300 " "
Excavation, Class 2	23a	30 " "
Excavation, Class 3	24a	20 " "
Backfilling	37	500 " "
Concrete	41	400 " "
Concrete	41a	200 " "
Cement	50	950 bbls.
Reinforcing steel	51	18,500 lbs.
Timber piles	72	1,000 lin. ft.
Removing, transporting and re-erecting existing superstructure	81	Two 120-ft. spans
Riprap	58	150 cu. yds.

Table 5.—Estimate of Quantities—Lockington Retarding Basin—Dam and Appurtenances

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Stream Control at Dam	Item	Estimated Quantity
Risk, damage, etc.	1	1 job
Cut-off Trench at Dam		
Earth excavation, Class 1, above mean low water, placed in dam	6	65,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	33,000 " "
Mixed excavation, Class 2, above mean low water	*7	3,000 " "
Mixed excavation, Class 2, below mean low water	*7a	2,000 " "
Rock excavation, Class 3, above mean low water..	*8	2,000 " "
Rock excavation, Class 3, below mean low water..	*8a	1,000 " "
Wood sheet piling	73	140 M.ft.B.M.
Steel sheet piling	74	380 tons
Main Dam		
Clearing and grubbing	2	10 acres
Removal of buildings	3	1 job
Soil stripping, used in dam	5	42,000 cu. yds.
Embankment, Class A, hydraulic fill	31	840,000 " "
Embankment, Class B, semi-hydraulic fill	32	240,000 " "
Embankment, Class C, rolled fill	33	10,000 " "
Embankment, Class F, miscellaneous fill	*36	2,000 " "
Surface dressing and grassing	38	45,000 " "
Earth excavation, Class 1, for minor drainage systems	16	1,400 " "
Furnishing vitrified pipe	55	9,000 lin. ft.
Furnishing vitrified pipe specials	55	10 pieces
Laying vitrified pipe	56	9,020 lin. ft.
Gutter paving	59	1,600 sq. yds.
Cleaning up	85	1 job
Outlet Works and Spillway		
Earth excavation, Class 1 ,above mean low water, placed in dam	13	74,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	13a	28,000 " "
Mixed excavation, Class 2, above mean low water	*14	2,000 " "
Mixed excavation, Class 2, below mean low water	*14a	1,000 " "
Rock excavation, Class 3, above mean low water..	*15	1,000 " "
Rock excavation, Class 3, below mean low water..	15a	4,500 " "
Mixed excavation, Class 2, for minor drainage systems	*17	200 " "

Table 5.—Estimate of Quantities—Lockington Retarding Basin—Dam and Appurtenances—(Continued)

Outlet Works and Spillway—(Continued)	Item	Estimated Quantity
Rock excavation, Class 3, for minor drainage systems	*18	100 cu. yds.
Earth excavation, Class 1, miscellaneous	*28	1,000 " "
Mixed excavation, Class 2, miscellaneous	*29	500 " "
Rock excavation, Class 3, miscellaneous	*30	200 " "
Drilling of foundations or masonry	*53	5,000 lin. ft.
Grouting of foundations or masonry	*54	1,000 cu. yds.
Miscellaneous cast iron, wrought iron and steel (pipe for grouting)	*82	30,000 lbs.
Concrete in spillway weir above mean low water	41	3,500 cu. yds.
Concrete in side walls above mean low water	41	22,000 " "
Concrete in spillway weir below mean low water	41a	800 " "
Concrete in side walls below mean low water	41a	6,650 " "
Concrete in conduit linings	42	200 " "
Concrete in paving and floors below mean low water	43a	3,800 " "
Cement	50	61,000 bbls.
Reinforcing steel	51	35,000 lbs.
Vitrified brick lining	52	36 cu. yds.
Furnishing vitrified pipe	55	1,000 lin. ft.
Furnishing vitrified pipe specials	55	20 pieces
Laying vitrified pipe	56	1,040 lin. ft.
Embankment, Class F, miscellaneous fill	*36	3,000 cu. yds.
Backfilling around structures	37	15,000 " "
Dry rubble paving	57	1,600 " "
Riprap	58	2,200 " "
Crushed rock or gravel	*60	1,000 " "
Protective boom and accessories, lumber	70	22 M.ft.B.M.
Protective boom and accessories, concrete, above mean low water	41	500 cu. yds.
Protective boom and accessories, concrete, below mean low water	41a	50 " "
Protective boom and accessories, miscellaneous cast iron, wrought iron, and steel	82	20,000 lbs.
Timber and lumber, miscellaneous	*71	10 M.ft.B.M.
Timber piles, less than 20 feet long	*72	3,000 lin. ft.
Timber piles, over 20 feet long	*72x	2,000 " "
Cleaning up	85	1 job

Table 6.—Estimate of Quantities—Lockington Retarding Basin—Roads and Bridges

Road No. 8	Item	Estimated Quantity
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	700 cu. yds.
Excavation from cut, Class 2	20	40 " "
Excavation from cut, Class 3	21	20 " "
Iron Pipe Culverts	82	300 lbs.
Road Surfacing		
Unrolled gravel	60	1,200 cu. yds.
Guard Rails	67	13,000 lin. ft.
Wire Fences		
Fence	68	2,400 " "
Miscellaneous lumber	71	0.1 M.ft.B.M.
Miscellaneous iron and steel	82	300 lbs.
Steel Bridge		
Superstructure	78	One 86-ft. span
Road No. 9		
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	9,300 cu. yds.
Excavation from borrow, Class 1	19	3,000 " "
Excavation from cut, Class 2	20	200 " "
Excavation from cut, Class 3	21	200 " "
Culverts		
Two 12-inch vitrified pipe culverts		
Excavation, Class 1	19	20 " "
Backfilling	37	10 " "
Concrete	46	10 " "
Cement	50	20 bbls.
Steel	51	100 lbs.
Vitrified pipe	55	60 lin. ft.
Four 18-inch vitrified pipe culverts		
Excavation, Class 1	19	40 cu. yds.
Backfilling	37	20 " "
Concrete	46	30 " "
Cement	50	50 bbls.
Reinforcing steel	51	300 lbs.
Vitrified pipe	55	110 lin. ft.
Two 3 ft. x 2 ft. concrete box culverts		
Excavation, Class 1	19	60 cu. yds.
Backfilling	37	40 " "
Concrete	46	40 " "
Cement	50	70 bbls.
Reinforcing steel	51	2,600 lbs.

Table 6.—Estimate of Quantities—Lockington Retarding Basin—Roads and Bridges—(Continued)

Road No. 9—(Continued)	Item	Estimated Quantity
Two 6 ft. x 4 ft. concrete box culverts		
Excavation, Class 1	19	80 cu. yds.
Backfilling	37	50 " "
Concrete	46	60 " "
Cement	50	105 bbls.
Reinforcing steel	51	4,100 lbs.
Iron pipe culverts	82	2,600 "
Road Surfacing		
Unrolled gravel	60	1,600 cu. yds.
Guard Rails	67	1,400 lin. ft.
Wire Fences		
Fence	68	14,200 " "
Miscellaneous lumber	71	0.6 M.ft.B.M.
Miscellaneous iron and steel	82	2,200 lbs.
Steel Bridge		
Substructure		
Excavation, Class 1	22	250 cu. yds.
Excavation, Class 2	23	60 " "
Excavation, Class 3	24	40 " "
Backfilling	37	150 " "
Concrete	41	200 " "
Cement	50	300 bbls.
Superstructure	78	One 50-ft. span
Road No. 10		
Clearing and grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	300 cu. yds.
Excavation from borrow, Class 1	19	26,700 " "
Culverts		
One 4 ft. x 3 ft. concrete box culvert		
Excavation, Class 1	19	50 " "
Backfilling	37	30 " "
Concrete	46	30 " "
Cement	50	55 bbls.
Reinforcing steel	51	1,600 lbs.
One 3 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	50 cu. yds.
Backfilling	37	30 " "
Concrete	46	20 " "
Cement	50	35 bbls.
Reinforcing steel	51	1,300 lbs.
Iron pipe culverts	82	300 "

Table 6.—Estimate of Quantities—Lockington Retarding Basin—Roads and Bridges—(Continued)

Road No. 10—(Continued)	Item	Estimated Quantity
Road Surfacing		
Unrolled gravel	60	400 cu. yds.
Guard Rails	67	2,600 lin. ft.
Wire Fences		
Fence	68	1,000 " "
Miscellaneous iron and steel	82	300 lbs.
Road No. 11		
Clearing and grubbing	2	4.5 acres
Grading		
Excavation from cut, Class 1	19	10,000 cu. yds.
Excavation from borrow, Class 1	19	4,550 " "
Excavation from cut, Class 2	20	300 " "
Excavation from cut, Class 3	21	200 " "
Culverts		
One 4 ft. x 3 ft. concrete box culvert		
Excavation, Class 1	19	30 cu. yds.
Backfilling	37	20 " "
Concrete	46	15 " "
Cement	50	25 bbls.
Reinforcing steel	51	700 lbs.
Eight 18-inch vitrified pipe culverts		
Excavation, Class 1	19	120 cu. yds.
Backfilling	37	100 " "
Concrete	46	55 " "
Cement	50	105 bbls.
Reinforcing steel	51	600 lbs.
Vitrified pipe	55	200 lin. ft.
Iron pipe culverts	82	1,700 lbs.
Concrete Slab Bridge		
Excavation, Class 1	22	50 cu. yds.
Excavation, Class 2	23	10 " "
Excavation, Class 3	24	20 " "
Backfilling	37	30 " "
Concrete in substructure	41	60 " "
Concrete in superstructure	46	40 " "
Cement	50	160 bbls.
Reinforcing steel	51	4,000 lbs.
Pipe railing	82	450 "
Road Surfacing		
Unrolled gravel	60	1,600 cu. yds.
Guard Rails	67	900 lin. ft.
Wire Fences		
Fence	68	19,000 " "
Miscellaneous lumber	71	0.5 M.ft.B.M.
Miscellaneous iron and steel	82	1,650 lbs.

Table 7.—Estimate of Quantities—Taylorsville Retarding Basin—Dam and Appurtenances

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

	Item	Estimated Quantity
Stream Control at Dam		
Risk, damage, etc., and 25,000 cu. yds. of embankment outside of dam, not to be paid for as embankment	1	1 job
Riprap placed	58	1,500 cu. yds.
Cleaning up (21,000 cu. yds. of excavation in stream control dikes)	85	1 job
Cut-off Trench at Dam		
Earth excavation, Class 1, above mean low water, placed in dam	6	39,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	56,000 " "
Mixed excavation, Class 2, above mean low water	7	10,000 " "
Mixed excavation, Class 2, below mean low water	7a	5,000 " "
Rock excavation, Class 3, above mean low water	8	5,000 " "
Rock excavation, Class 3, below mean low water	8a	1,000 " "
Wood sheet piling	73	120 M.ft.B.M.
Steel sheet piling	74	350 tons
Main Dam		
Removal of buildings	3	1 job
Soil stripping, used in dam	5	34,000 cu. yds.
Embankment, Class A, hydraulic fill	31	580,000 " "
Embankment, Class B, semi-hydraulic fill	32	610,000 " "
Embankment, Class C, rolled fill	33	10,000 " "
Surface dressing and grassing	38	35,000 " "
Earth excavation, Class 1, for minor drainage systems	16	1,200 " "
Furnishing vitrified pipe	55	8,600 lin. ft.
Furnishing vitrified pipe specials	55	10 pieces
Laying vitrified pipe	56	8,620 lin. ft.
Gutter paving	59	1,100 sq. yds.
Cleaning up	85	1 job
Outlet Works and Spillway		
Clearing and grubbing	2	21 acres
Earth excavation, Class 1, above mean low water, placed in dam	13	450,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	13a	35,000 " "
Mixed excavation, Class 2, above mean low water	14	216,000 " "
Mixed excavation, Class 2, below mean low water	14a	91,000 " "
Rock excavation, Class 3, above mean low water	*15	3,000 " "
Rock excavation, Class 3, below mean low water	*15a	2,000 " "
Mixed excavation, Class 2, for minor drainage systems	*17	400 " "

Table 7.—Estimate of Quantities—Taylorsville Retarding Basin—Dam and Appurtenances—(Continued)

Outlet Works and Spillway—(Continued)	Item	Estimated Quantity
Rock excavation, Class 3, for minor drainage systems	*18	200 cu. yds.
Earth excavation, Class 1, miscellaneous	*28	5,000 " "
Mixed excavation, Class 2, miscellaneous	*29	2,000 " "
Rock excavation, Class 3, miscellaneous	*30	1,000 " "
Drilling of foundations or masonry	*53	5,000 lin. ft.
Grouting of foundations or masonry	*54	1,000 cu. yds.
Miscellaneous cast iron, wrought iron and steel (pipe for grouting)	*82	30,000 lbs.
Concrete in west side wall above mean low water	41	11,900 cu. yds.
Concrete in west side wall below mean low water	41a	4,620 " "
Concrete in east side wall above mean low water	41	7,300 " "
Concrete in east side wall below mean low water	41a	1,570 " "
Concrete in rock facing along east side of channel, above mean low water	41	1,100 " "
Concrete in rock facing along east side of channel, below mean low water	41a	630 " "
Concrete in spillway weir (including training piers) above mean low water	41	5,650 " "
Concrete in spillway weir (including training piers) below mean low water	41a	2,380 " "
Concrete in conduit linings	42	800 " "
Concrete in floor of entrance and outlet below mean low water	43a	12,000 " "
Cement	50	80,000 bbls.
Reinforcing steel	*51	200,000 lbs.
Vitrified brick lining	52	84 cu. yds.
Furnishing vitrified pipe	55	4,400 lin. ft.
Furnishing vitrified pipe specials	55	50 pieces
Laying vitrified pipe	56	4,500 lin. ft.
Embankment, Class F, miscellaneous fill	*36	10,000 cu. yds.
Backfilling around structures	37	14,000 " "
Dry rubble paving	57	2,500 " "
Riprap	58	4,000 " "
Crushed rock or gravel	*60	1,000 " "
Protective boom and accessories, concrete in piers, above mean low water	41	1,050 " "
Protective boom and accessories, concrete in piers, below mean low water	41a	800 " "
Protective boom and accessories, reinforcing steel	51	200,000 lbs.
Protective boom and accessories, lumber	70	28 M.ft.B.M.
Protective boom and accessories, miscellaneous cast iron, wrought iron, and steel	82	30,000 lbs.
Timber and lumber, miscellaneous	71	10 M.ft.B.M.
Timber piles, less than 20 feet long	*72	3,000 lin. ft.
Timber piles, over 20 feet long	*72	2,000 " "
Cleaning up	85	1 job

Table 8.—Estimate of Quantities—Taylorsville Retarding Basin—Roads and Bridges

	Item	Estimated Quantity
Road No. 12		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	1,760 cu. yds.
Excavation from borrow, Class 1	19	2,900 " "
Excavation from cut, Class 2	20	200 " "
Excavation from cut, Class 3	21	100 " "
Culverts		
One 3 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	20 " "
Backfilling	37	15 " "
Concrete	46	15 " "
Cement	50	25 bbls.
Reinforcing steel	51	300 lbs.
Two 18-inch vitrified pipe culverts		
Excavation, Class 1	19	20 cu. yds.
Backfilling	37	15 " "
Concrete	46	15 " "
Cement	50	25 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	50 lin. ft.
Iron pipe culverts	82	900 lbs.
Road Surfacing		
Unrolled gravel	60	600 cu. yds.
Guard Rails	67	200 lin. ft.
Wire Fences		
Fence	68	7,200 " "
Miscellaneous lumber	71	0.2 M.ft.B.M.
Miscellaneous iron and steel	82	900 lbs.
Road No. 13		
Clearing and Grubbing	2	1.5 acres
Grading		
Excavation from cut, Class 1	19	3,250 cu. yds.
Excavation from cut, Class 2	20	200 " "
Excavation from cut, Class 3	21	100 " "
Culverts		
One 2 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	30 " "
Backfilling	37	20 " "
Concrete	46	20 " "
Cement	50	35 bbls.
Reinforcing steel	51	900 lbs.
Two 12-inch vitrified pipe culverts		
Excavation, Class 1	19	20 cu. yds.
Backfilling	37	10 " "
Concrete	46	10 " "
Cement	50	15 bbls.
Reinforcing steel	51	100 lbs.
Vitrified pipe	55	60 lin. ft.

Table 8.—Estimate of Quantities—Taylorsville Retarding Basin—Roads and Bridges—(Continued)

Road No. 13—(Continued)	Item	Estimated Quantity
Iron pipe culverts	82	900 lbs.
Road Surfacing		
Unrolled gravel	60	1,300 cu. yds.
Guard Rails	67	6,000 lin. ft.
Wire Fences		
Fence	68	10,200 " "
Miscellaneous lumber	71	0.2 M.ft.B.M.
Miscellaneous iron	82	900 lbs.
Steel Bridges		
One substructure		
Excavation, Class 1	22	600 cu. yds.
Excavation, Class 2	23	100 " "
Excavation, Class 3	24	40 " "
Backfilling	37	500 " "
Concrete	41	900 " "
Cement	50	1,400 bbls.
Superstructure	78	One 32-ft. span
Superstructure	78	One 145-ft. span
Road No. 14		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from borrow, Class 1	19	28,000 cu. yds.
Culverts		
One 4 ft. x 3 ft. concrete box culvert		
Excavation, Class 1	19	100 " "
Backfilling	37	50 " "
Concrete	46	30 " "
Cement	50	50 bbls.
Reinforcing steel	51	1,800 lbs.
Road Surfacing		
Rolled gravel	61	2,300 sq. yds.
Guard Rails	67	2,400 lin. ft.
Wire Fences	68	2,400 " "
Road No. 15		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from borrow, Class 1	19	15,200 cu. yds.
Culverts		
One 4 ft. x 3 ft. concrete box culvert		
Excavation, Class 1	19	100 " "
Backfilling	37	50 " "
Concrete	46	30 " "
Cement	50	50 bbls.
Reinforcing steel	51	1,800 lbs.
Road Surfacing		
Unrolled gravel	60	200 cu. yds.
Guard Rails	67	2,200 lin. ft.
Wire Fences	68	2,200 " "

Table 9.—Estimate of Quantities—Taylorsville Retarding Basin—Protection for Tippecanoe City

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Levee Construction	Item	Estimated Quantity
Clearing and grubbing	2	10 acres
Removal of buildings	3	1 job
Soil stripping	5	10,200 cu. yds.
Embankment, Class E, (from borrow pits)	35	220,000 " "
Surface dressing and grassing	38	11,000 " "
Retaining Walls		
Excavation, Class 2, for retaining walls	*23	10 " "
Excavation, Class 2, for same, below mean low water	*23a	5 " "
Backfilling	*37	10 " "
Concrete	41	5 " "
Cement	50	6 bbls.
Reinforcing steel	51	1,000 lbs.
Drainage System		
Excavation, Class 1, minor drainage	16	10,000 cu. yds.
Excavation, Class 2, minor drainage	*17	200 " "
Excavation, Class 3, minor drainage	*18	50 " "
Excavation, Class 1, and backfilling for trenches	25	14,000 " "
Excavation, Class 2, and backfilling for trenches	*26	300 " "
Excavation, Class 3, and backfilling for trenches	*27	100 " "
Concrete apron	43	50 " "
Concrete in culverts, etc.	46	2,400 " "
Concrete in manholes, etc.	47	50 " "
Cement	50	3,054 bbls.
Reinforcing steel	51	40,000 lbs.
Furnishing vitrified pipe	55	List price $806
Laying vitrified pipe	56	9,000 inch-ft.
Timber piles	*72	100 lin. ft.
Furnishing cast iron pipe	75	3 tons
Laying cast iron pipe	76	580 inch-ft.
Flood gates	77	11,000 lbs.
Miscellaneous cast iron, wrought iron and steel	82	15,000 "
Street and Railroad Modifications		
Excavation, Class 1, cuts and fills	19	10,500 cu. yds.
Excavation, Class 2, cuts and fills	20	100 " "
Excavation, Class 3, cuts and fills	21	120 " "
Macadam paving	62	2,900 sq. yds.
Concrete paving	65	2,100 " "
Cement	50	420 bbls.
Guard rails	*67	1,000 lin. ft.

Table 10.—Estimate of Quantities—Huffman Retarding Basin—Dam and Appurtenances

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

General	Item	Estimated Quantity
Excavation, Class 1, miscellaneous	*28	10 cu. yds.
Excavation, Class 2, miscellaneous	*29	10 " "
Excavation, Class 3, miscellaneous	*30	10 " "
Cleaning up	85	1 job
Stream Control at Dam		
Risk, damage, and 15,500 cu. yds. of embankment outside of dam, not to be paid for as embankment	1	1 job
Earth excavation, Class 1, above mean low water, placed in dam	6	25,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	21,000 " "
Riprap placed	58	7,600 " "
Riprap removed, Class 1, above mean low water, within limits of dam	6	2,400 " "
Riprap removed, Class 1, below mean low water, within limits of dam	6a	4,400 " "
Cleaning up (7,600 cu. yds. of excavation in stream control dikes)	85	1 job
Cut-off Trench at Dam		
Earth excavation, Class 1, above mean low water, placed in dam	6	30,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	6a	91,000 " "
Mixed excavation, Class 2, above mean low water	7	10,000 " "
Mixed excavation, Class 2, below mean low water	7a	5,000 " "
Rock excavation, Class 3, above mean low water	*8	5,000 " "
Rock excavation, Class 3, below mean low water	*8a	1,000 " "
Wood sheet piling	73	156 M.ft.B.M.
Steel sheet piling	74	455 tons
Main Dam		
Clearing and grubbing	2	6 acres
Removal of buildings	3	1 job
Soil stripping used in dam	5	46,000 cu. yds.
Earth excavation, Class 1, for minor drainage systems	16	1,600 " "
Embankment, Class A, hydraulic fill	31	1,360,000 " "
Embankment, Class B, semi-hydraulic fill	32	250,000 " "
Embankment, Class C, rolled fill	*33	20,000 " "
Surface dressing and grassing	38	45,000 " "
Furnishing vitrified pipe	55	8,900 lin. ft.

Table 10.—Estimate of Quantities—Huffman Retarding Basin—Dam and Appurtenances—(Continued)

Main Dam—(Continued)	Item	Estimated Quantity
Furnishing vitrified pipe specials	55	10 pieces
Laying vitrified pipe	56	8,920 lin. ft.
Gutter paving	59	1,400 sq. yds.
Cleaning up	85	1 job
Outlet Works and Spillway		
Clearing and grubbing	2	8 acres
Earth excavation, Class 1, above mean low water, placed in dam	13	33,000 cu. yds.
Earth excavation, Class 1, below mean low water, placed in dam	13a	4,000 " "
Mixed excavation, Class 2, above mean low water	14	122,000 " "
Mixed excavation, Class 2, below mean low water	14a	38,000 " "
Rock excavation, Class 3, above mean low water	*15	5,000 " "
Rock excavation, Class 3, below mean low water	*15a	3,000 " "
Mixed excavation, Class 2, for minor drainage systems	*17	500 " "
Rock excavation, Class 3, for minor drainage systems	*18	300 " "
Earth excavation, Class 1, miscellaneous	*28	5,000 " "
Mixed excavation, Class 2, miscellaneous	*29	3,000 " "
Rock excavation, Class 3, miscellaneous	*30	1,000 " "
Embankment, Class F, miscellaneous	*36	10,000 " "
Backfill around structures	37	2,600 " "
Concrete in south wall above mean low water	41	7,450 " "
Concrete in south wall below mean low water	41a	2,020 " "
Concrete in north wall, above mean low water	41	10,300 " "
Concrete in north wall, below mean low water	41a	3,760 " "
Concrete in spillway proper, above mean low water	41	4,350 " "
Concrete in spillway proper, below mean low water	41a	1,540 " "
Concrete in vertical cutoffs in dam, above mean low water	41	680 " "
Concrete in conduit lining	42	300 " "
Concrete in floor paving—entrance and outlet below mean low water	43a	9,500 " "
Cement	50	65,000 bbls.
Reinforcing steel	51	100,000 lbs.
Protective boom and accessories, reinforced concrete in piers, above mean low water	41	660 cu. yds.
Protective boom and accessories, reinforced concrete in piers, below mean low water	41a	240 " "
Protective boom and accessories, lumber	70	22 M.ft.B.M.
Protective boom and accessories, reinforcing steel	51	100,000 lbs.
Protective boom and accessories, miscellaneous cast iron, wrought iron, and steel	82	25,000 "

Table 10.—Estimate of Quantities—Huffman Retarding Basin—Dam and Appurtenances—(Continued)

Outlet Works and Spillway—(Continued)	Item	Estimated Quantity
Vitrified brick lining	52	70 cu. yds.
Drilling foundations or masonry	*53	10,000 lin. ft.
Grouting foundations or masonry	*54	2,000 cu. yds.
Miscellaneous cast iron, wrought iron and steel, (grouting pipe)	*82	57,400 lbs.
Furnishing vitrified pipe	55	8,400 lin. ft.
Furnishing vitrified pipe specials	55	90 pieces
Laying vitrified pipe	56	8,580 lin. ft.
Dry rubble paving	57	1,800 cu. yds.
Riprap	58	400 " "
Crushed rock or gravel	*60	1,000 " "
Timber and lumber, miscellaneous	*71	15 M.ft.B.M.
Timber piles	*72	3,000 lin. ft.
Timber piles over 20 feet long	*72x	2,000 " "
Cleaning up	85	1 job

Table 11.—Estimate of Quantities—Huffman Retarding Basin—Roads and Bridges

Road No. 16	Item	Estimated Quantity
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	11,400 cu. yds.
Excavation from borrow, Class 1	19	4,000 " "
Excavation from cut, Class 2	20	400 " "
Excavation from cut, Class 3	21	200 " "
Culverts		
Three 18-inch vitrified pipe culverts		
Excavation, Class 1	19	30 " "
Backfilling	37	10 " "
Concrete	46	20 " "
Cement	50	30 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	120 lin. ft.
Eight 12-inch vitrified pipe culverts		
Excavation, Class 1	19	100 cu. yds.
Backfilling	37	50 " "
Concrete	46	40 " "
Cement	50	70 bbls.
Reinforcing steel	51	400 lbs.
Vitrified pipe	55	200 lin. ft.
One 6 ft. x 4 ft. concrete box culvert		
Excavation, Class 1	19	40 cu. yds.
Backfilling	37	20 " "
Concrete	46	25 " "
Cement	50	45 bbls.
Reinforcing steel	51	1,500 lbs.
One 3 ft. x 3 ft. concrete box culvert		
Excavation, Class 1	19	30 cu. yds.
Backfilling	37	20 " "
Concrete	46	25 " "
Cement	50	45 bbls.
Reinforcing steel	51	1,500 lbs.
Iron pipe culverts	82	2,000 "
Concrete Slab Bridges		
Excavation, Class 1	22	40 cu. yds.
Excavation, Class 2	23	20 " "
Excavation, Class 3	24	20 " "
Backfilling	37	40 " "
Concrete in substructure	41	60 " "
Concrete in superstructure	46	10 " "
Cement	50	100 bbls.
Reinforcing steel	51	1,300 lbs.
Road Surfacing		
Rolled gravel	61	21,500 sq. yds.

Table 11.—Estimate of Quantities—Huffman Retarding Basin—Roads and Bridges—(Continued)

Road No. 16—(Continued)	Item	Estimated Quantity
Guard Rails	67	500 lin. ft.
Wire Fences		
Fence	68	24,000 " "
Miscellaneous lumber	71	0.5 M.ft.B.M.
Miscellaneous iron and steel	82	1,800 lbs.
Road No. 17		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from cut, Class 1	19	2,370 cu. yds.
Excavation from cut, Class 2	20	400 " "
Excavation from cut, Class 3	21	100 " "
Culverts		
Three 18-inch vitrified pipe culverts		
Excavation, Class 1	19	30 " "
Backfilling	37	20 " "
Concrete	46	20 " "
Cement	50	35 bbls.
Reinforcing steel	51	200 lbs.
Vitrified pipe	55	80 lin. ft.
Iron pipe culverts	62	300 lbs.
Steel Bridges		
Superstructure	78	One 108-ft. span
Guard Rails	67	6,600 lin. ft.
Wire Fences		
Fence	68	4,400 " "
Miscellaneous lumber	71	0.1 M.ft.B.M.
Miscellaneous iron and steel	82	300 lbs.
Road Surfacing		
Unrolled gravel	60	900 cu. yds.
Road No. 18		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from borrow, Class 1	19	83,000 cu. yds.
Concrete Slab Bridge		
Excavation, Class 1	22	60 " "
Excavation, Class 2	23	20 " "
Excavation, Class 3	24	60 " "
Backfilling	37	60 " "
Concrete in substructure	41	100 " "
Concrete in superstructure	46	50 " "
Cement	50	220 bbls.
Reinforcing steel	51	5,400 lbs.
Lengthening Existing Concrete Bridge		
Excavation, Class 1	22	20 cu. yds.
Excavation, Class 2	23	10 " "

Table 11.—Estimate of Quantities—Huffman Retarding Basin—Roads and Bridges—(Continued)

Road No. 18—(Continued)	Item	Estimated Quantity
Excavation, Class 3	24	12 cu. yds.
Backfilling	37	20 " "
Concrete in substructure	41	20 " "
Concrete in superstructure	46	10 " "
Cement	50	50 bbls.
Reinforcing steel	51	700 lbs.
Miscellaneous iron railing	82	400 "
Iron Pipe Culverts	82	2,400 lin. ft.
Road Surfacing		
Rolled gravel	61	19,500 sq. yds.
Guard Rails	67	5,600 lin. ft.
Wire Fences	68	7,400 " "
Miscellaneous iron gates	82	2,200 lbs.
Road No. 19		
Clearing and Grubbing	2	0.5 acre
Grading		
Excavation from borrow, Class 1	19	24,930 cu. yds.
Culverts		
Four 3 ft. x 2 ft. concrete box culverts		
Excavation, Class 1	19	50 " "
Backfilling	37	30 " "
Concrete	46	55 " "
Cement	50	95 bbls.
Reinforcing steel	51	4,400 lbs.
One 2 ft. x 2 ft. concrete box culvert		
Excavation, Class 1	19	20 cu. yds.
Backfilling	37	20 " "
Concrete	46	15 " "
Cement	50	25 bbls.
Reinforcing steel	51	600 lbs.
Iron pipe culverts	82	1,600 "
Lengthening Existing Concrete Bridges		
Excavation, Class 1	22	20 cu. yds.
Excavation, Class 2	23	10 " "
Excavation, Class 3	24	8 " "
Backfilling	37	20 " "
Concrete in substructure	41	10 " "
Concrete in superstructure	46	10 " "
Cement	50	30 bbls.
Reinforcing steel	51	800 lbs.
Road Surfacing		
Unrolled gravel	60	1,400 cu. yds.
Guard Rails	67	1,000 lin. ft.
Wire Fence		
Fence	68	6,000 " "
Gates—miscellaneous iron and steel	82	1,800 lbs.

Table 12.—Estimate of Quantities—Huffman Retarding Basin—Protection for Fairfield

	Item	Estimated Quantity
Levee Construction		
Clearing and grubbing	2	3 acres
Removal of buildings	3	1 job
Excavation, soil stripping	5	6,500 cu. yds.
Embankment, Class E, from borrow pits	35	65,000 " "
Surface dressing and grassing	38	6,000 " "
Drainage System		
Excavation, Class 1, open ditch	16	50 " "
Excavation, Class 2, open ditch	17	5 " "
Excavation, Class 3, open ditch	18	2 " "
Excavation, Class 1, for street and highway cuts and fills	19	50 " "
Excavation, Class 2, for street and highway cuts and fills	20	5 " "
Excavation, Class 3, for street and highway cuts and fills	21	2 " "
Excavation, Class 1, and backfilling for trenches	25	50 " "
Excavation, Class 2, and backfilling for trenches	26	10 " "
Excavation, Class 3, and backfilling for trenches	27	5 " "
Concrete in culverts, gate chambers, etc	46	200 " "
Cement	50	350 bbls.
Reinforcing steel	51	5,000 lbs.
Furnishing vitrified pipe	55	List price, $68
Laying vitrified pipe	56	720 inch-ft.
Furnishing cast iron pipe	75	1 ton
Laying cast iron pipe	76	220 inch-ft.
Flood gates	77	10,000 lbs.
Miscellaneous cast iron, wrought iron and steel	82	1,000 "
Street and Railroad Modifications		
Excavation, Class 1, for street and highway cuts and fills	19	8,600 cu. yds.
Excavation, Class 2, for street and highway cuts and fills	20	50 " "
Excavation, Class 3, for street and highway cuts and fills	21	10 " "
Gravel paving for streets and highways	61	10,000 sq. yds.
Guard rails	67	5,000 lin. ft.
General		
Excavation, Class 2, for retaining walls	23	20 cu. yds.
Excavation, Class 1, miscellaneous	28	50 " "
Excavation, Class 2, miscellaneous	29	5 " "
Excavation, Class 3, miscellaneous	30	2 " "
Concrete in retaining walls	41	10 " "
Cleaning up	85	1 job

Table 13.—Estimate of Quantities—Local Flood Protection at Piqua

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	2 acres
Trimming and shaping slopes of river channels	4	4,000 sq. yds.
Soil stripping	5	3,000 cu. yds.
Excavation, Class 1, in river channel	9	130,000 " "
Excavation, Class 2, in river channel	10	2,000 " "
Excavation, Class 3, in river channel	11	200 " "
Overhaul, per 100 feet	12	100,000 " "
Surface dressing and grassing	38	700 " "
Levee Construction		
Clearing and grubbing	2	15 acres
Removal of buildings	3	1 job
Soil stripping	5	16,500 cu. yds.
Embankment, Class D (from river excavation)	34	130,000 " "
Embankment, Class E (from borrow pits)	35	20,000 " "
Surface dressing and grassing	38	11,300 " "
Revetment		
Excavation, Class 1, for retaining walls, etc., below mean low water	22a	600 " "
Excavation, Class 2, for retaining walls, etc., below mean low water	23a	200 " "
Excavation, Class 3, for retaining walls, etc., below mean low water	24a	50 " "
Concrete in monolithic slope revetment	44	750 " "
Concrete in monolithic slope revetment, below mean low water	44a	650 " "
Cement	50	1,750 bbls.
Reinforcing steel	51	16,000 lbs.
Retaining Walls		
Excavation, Class 1	22	1,500 cu. yds.
Excavation, Class 2	23	200 " "
Excavation, Class 3	24	100 " "
Backfilling	37	100 " "
Concrete	41	3,000 " "
Cement	50	3,750 bbls.
Timber piles	72	1,000 lin. ft.

Table 13.—Estimate of Quantities—Local Flood Protection at Piqua (Continued)

Flood Gate Structures	Item	Estimated Quantity
Excavation, Class 2, for flood gate structures	23	40 cu. yds.
Excavation, Class 2, for flood gate structures, below mean low water	23a	10 " "
Concrete	46	80 " "
Concrete below mean low water	46a	20 " "
Cement	50	220 bbls.
Reinforcing steel	51	2,000 lbs.
Steel sheet piling	74	6 tons
Flood gates	77	11,000 lbs.
Miscellaneous cast iron, wrought iron, and steel	82	1,500 "
Drainage System		
Excavation, Class 1	16	3,500 cu. yds.
Excavation, Class 2	17	500 " "
Excavation, Class 3	18	50 " "
Excavation, Class 1, and backfilling for trenches	25	100 " "
Concrete in culverts	46	130 " "
Cement	50	165 bbls.
Reinforcing steel	51	4,000 lbs.
Furnishing vitrified pipe	55	List price, $100
Laying vitrified pipe	56	1,200 inch-ft.
Furnishing cast iron pipe	75	2 tons
Laying cast iron pipe	76	600 inch-ft.
Flood gates	77	1,000 lbs.
Street Modifications		
Excavation, Class 1	19	1,000 cu. yds.
Gravel paving for streets and highways	61	2,500 sq. yds.
Guard rails	67	1,000 lin. ft.
General		
Excavation, Class 1, miscellaneous	*28	100 cu. yds.
Excavation, Class 2, miscellaneous	*29	50 " "
Excavation, Class 3, miscellaneous	*30	10 " "
Cleaning up	85	1 job

Table 14.—Estimate of Quantities—Local Flood Protection at Troy

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	10 acres
Excavation, Class 1, new channel	6	83,000 cu. yds.
Excavation, Class 2, new channel	*7	500 " "
Excavation, Class 3, new channel	*8	100 " "
Excavation, Class 1, for same below mean low water	6a	4,500 " "
Excavation, Class 2, for same below mean low water	*7a	400 " "
Excavation, Class 3, for same below mean low water	*8a	100 " "
Excavation, Class 1, in river channel	9	149,200 " "
Excavation, Class 1, removing islands	9	8,200 " "
Excavation, Class 2, in river channel	*10	2,000 " "
Excavation, Class 2, removing islands	*10	500 " "
Excavation, Class 3	*11	2,000 " "
Overhaul, per 100 feet	12	10,000 " "
Steel sheet piling	74	80 tons
Levee Construction		
Removal of buildings	3	1 job
Soil stripping	5	12,700 cu. yds.
Embankment, Class D	34	68,100 " "
Embankment, Class E	35	27,000 " "
Surface dressing and grassing	38	11,100 " "
Revetment		
Concrete in monolithic slope revetment	44	140 " "
Concrete in flexible slab revetment	45	280 " "
Cement	50	535 bbls.
Reinforcing steel	51	31,500 lbs.
Timber piles	72	300 lin. ft.
Miscellaneous cast iron	82	5,600 lbs.
Retaining Wall		
Backfilling	37	10 cu. yds.
Stone masonry	48	10 " "
Crushed rock and gravel	60	10 " "

Table 14.—Estimate of Quantities—Local Flood Protection at Troy (Continued)

Flood Gate Structures	Item	Estimated Quantity
Excavation, Class 2	23	20 cu. yds.
Excavation, Class 2, below mean low water	*23a	80 " "
Concrete	46	25 " "
Concrete below mean low water	*46a	80 " "
Cement	50	135 bbls.
Flood gates	77	9,000 lbs.
Drainage System		
Excavation, open ditch	16	500 cu. yds.
Excavation and backfill in trench	25	800 " "
Concrete in apron, etc.	43	10 " "
Concrete in culverts and gate chambers	46	140 " "
Concrete in sewer manholes and catch basins	47	7 " "
Cement	50	200 bbls.
Furnishing vitrified pipe	55	List price, $800
Laying vitrified pipe	56	8,460 inch-ft.
Furnishing cast iron pipe	75	5 tons
Laying cast iron pipe	76	750 inch-ft.
Flood gates	77	8,400 lbs.
Miscellaneous iron and steel (manhole covers)	82	3,500 "
Bridge Protection		
Steel sheet piling	74	170 tons
Raising Bridges		
Excavation, Class 2	23	200 cu. yds.
Concrete	41	100 " "
Cement	50	120 " "
Raising bridge	81	1 job
Street and Railroad Modifications		
Excavation, Class 1	19	6,500 cu. yds.
Cement	50	640 bbls.
Water-bound macadam paving	62	4,800 sq. yds.
Concrete paving	65	3,000 " "
Guard rails	67	200 lin. ft.
Miscellaneous steel	82	43,000 lbs.
General		
Cleaning up	85	1 job

Table 15.—Estimate of Quantities—Local Flood Protection at Dayton

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	35 acres
Removal of buildings	3	1 job
Trimming and shaping slopes	4	75,000 sq. yds.
Soil stripping	5	30,000 cu. yds.
Earth excavation, Class 1, (new channels)	6	110,000 " "
Mixed excavation, Class 2, (new channels)	*7	75 " "
Rock excavation, Class 3, (new channels)	*8	25 " "
Earth excavation, Class 1, (river channel)	9	1,900,000 " "
Mixed excavation, Class 2, (river channel)	10	50,000 " "
Rock excavation, Class 3, (river channel)	11	3,000 " "
Overhaul per 100 feet	12	4,250,000 " "
Surface dressing and grassing	38	20,000 " "
Steel sheet piling	74	84 tons
Levee Construction		
Clearing and grubbing	2	5 acres
Soil stripping	5	32,500 cu. yds
Embankment, Class D, (from river excavation)	34	1,003,500 " "
Embankment, Class E, (from borrow pits)	35	162,000 " "
Surface dressing and grassing	38	68,000 " "
Revetment		
Concrete in monolithic slope revetment	44	8,000 " "
Concrete in monolithic slope revetment below mean low water	44a	500 " "
Concrete in flexible slab revetment	45	2,000 " "
Reinforcing steel	51	330,000 lbs.
Timber piles	72	15,000 lin. ft.
Steel sheet piling	74	84 tons
Miscellaneous iron and steel	82	45,000 lbs.
Cement	50	12,500 bbls.
Dry rubble paving	*57	10 cu. yds.
Retaining Walls		
Excavation, Class 1	22	35,000 " "
Excavation, Class 2	23	500 " "
Excavation, Class 3	24	100 " "
Excavation, Class 1, below mean low water	22a	10,000 " "
Excavation, Class 2, below mean low water	23a	90 " "
Excavation, Class 3, below mean low water	24a	50 " "
Backfilling	37	500 " "
Concrete	41	15,000 " "

Table 15.—Estimate of Quantities—Local Flood Protection at Dayton (Continued)

Retaining Walls—(Continued)	Item	Estimated Quantity
Concrete below mean low water	41a	8,000 cu. yds.
Cement	50	32,000 bbls.
Reinforcing steel	51	135,000 lbs.
Furnishing vitrified pipe	55	List Price, $1000
Laying vitrified pipe	56	18,000 inch-ft.
Crushed rock or gravel	60	500 cu. yds.
Timber piles	72	24,000 lin. ft.
Miscellaneous iron and steel	82	15,000 lbs.
Stone masonry	48	2,000 cu. yds.
Flood Gate Structures		
Excavation, Class 1	22	80 " "
Excavation, Class 2	23	10 " "
Excavation, Class 3	24	10 " "
Excavation, Class 1, below mean low water	22a	20 " "
Excavation, Class 2, below mean low water	23a	10 " "
Excavation, Class 3, below mean low water	24a	10 " "
Concrete	46	160 " "
Concrete below mean low water	46a	40 " "
Cement	50	275 bbls.
Reinforcing steel	51	4,000 lbs.
Steel sheet piling	74	12 tons
Flood gates	77	44,000 lbs.
Miscellaneous iron and steel	82	3,000 "
Drainage System		
Excavation, open ditch, Class 1	*16	10 cu. yds.
Excavation, open ditch, Class 2	*17	10 " "
Excavation, open ditch, Class 3	*18	10 " "
Excavation, Class 1, and backfilling for trenches	25	500 " "
Excavation, Class 2, and backfilling for trenches	*26	10 " "
Excavation, Class 3, and backfilling for trenches	*27	10 " "
Excavation, Class 1, and backfilling for trenches, below mean low water	25a	100 " "
Excavation, Class 2, and backfilling for trenches, below mean low water	*26a	10 " "
Excavation, Class 3, and backfilling for trenches, below mean low water	*27a	10 " "
Concrete aprons	*43	10 " "
Concrete in culverts, etc	46	10 " "
Concrete in sewers, manholes, and catch basins	47	150 " "
Cement	50	200 bbls.
Furnishing vitrified pipe	55	List Price, $200
Laying vitrified pipe	56	2,400 inch-ft.

Table 15.—Estimate of Quantities—Local Flood Protection at Dayton (Continued)

Drainage System—(Continued)	Item	Estimated Quantity
Furnishing cast iron pipe	*75	1 ton
Laying cast iron pipe	*76	200 inch-ft.
Timber and lumber miscellaneous	*71	1,000 ft. B. M.
Bridge Protection		
Concrete	41	25 cu. yds.
Cement	50	40 bbls.
Steel sheet piling	74	500 tons
Street and Railroad Modifications		
Excavation, Class 1	19	5,000 cu. yds.
Excavation, Class 2	*20	10 " "
Excavation, Class 3	*21	10 " "
Gravel paving	61	2,000 sq. yds.
Macadam paving	62	2,500 " "
Miscellaneous paving	*66	200 " "
Cement	50	35 bbls.
General		
Excavation, Class 1	*28	100 cu. yds.
Excavation, Class 2	*29	10 " "
Excavation, Class 3	*30	10 " "
Cleaning up		1 job

Table 16.—Estimate of Quantities—Local Flood Protection at West Carrollton

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Levee Construction	Item	Estimated Quantity
Clearing and grubbing	2	1 acre
Removal of buildings	3	1 job
Soil stripping	5	3,000 cu. yds.
Embankment, Class E, (from borrow)	35	34,000 " "
Surface dressing and grassing	38	5,000 " "
Retaining Walls		
Excavation, Class 1	*22	20 " "
Excavation, Class 2	*23	20 " "
Excavation, Class 3	*24	5 " "
Backfilling	*37	10 " "
Concrete	*41	6 " "
Cement	*50	10 bbls.
Drainage System		
Excavation, Class 1, and backfilling for trenches	25	40 cu. yds.
Excavation, Class 2, and backfilling for trenches	*26	10 " "
Excavation, Class 3, and backfilling for trenches	*27	10 " "
Concrete in culverts, etc	46	25 " "
Concrete in manholes, etc	47	10 " "
Cement	50	50 bbls.
Reinforcing steel	*51	1,000 lbs.
Vitrified pipe	55	List price, $195
Laying vitrified pipe	56	1,440 inch-ft.
Furnishing cast iron pipe	75	2 tons
Laying cast iron pipe	76	600 inch-ft.
Flood gates	77	2,500 lbs.
Miscellaneous cast iron, wrought iron, and steel	82	1,000 "
Raising Bridges		
Concrete	*41	10 cu. yds.
Cement	*50	20 bbls.
Raising existing bridges	81	1 job
Street and Railroad Modification		
Excavation for cuts and fills, Class 1	19	2,000 cu. yds.
Gravel paving	61	4,200 sq. yds.
Guard rails	67	1,000 lin. ft.
General		
Excavation—miscellaneous, Class 1	*28	10 cu. yds.
Excavation—miscellaneous, Class 2	*29	10 " "
Excavation—miscellaneous, Class 3	*30	10 " "
Cleaning up	85	1 job

Table 17.—Estimate of Quantities—Local Flood Protection at Miamisburg

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	10 acres
Trimming and shaping slopes	4	3,600 sq. yds.
Excavation, river channel, Class 1	9	2,000 cu. yds.
Excavation, river channel, Class 2	*10	100 " "
Excavation, river channel, Class 3	*11	50 " "
Levee Construction		
Clearing and grubbing, east side of river	2	2 acres
Clearing and grubbing, west side of river	2	1 acre
Removal of buildings, east side of river	3	1 job
Soil stripping, east side of river	5	14,400 cu. yds.
Soil stripping, west side of river	5	4,500 " "
Embankment, Class E, from borrow pit, east side of river	35	171,800 " "
Embankment, Class E, from borrow pit, west side of river	35	50,500 " "
Surface dressing and grassing, east side of river	38	7,825 " "
Surface dressing and grassing, west side of river	38	2,500 " "
Revetment		
Concrete in monolithic slope revetment	44	650 " "
Concrete in monolithic slope revetment below mean low water	44a	100 " "
Cement	50	1,120 bbls.
Reinforcing steel	51	12,500 lbs.
Timber piles	72	1,150 lin. ft.
Miscellaneous iron and steel	82	100 lbs.
Retaining Walls		
Excavation, Class 1	22	550 cu. yds.
Excavation, Class 2	*23	25 " "
Excavation, Class 3	*24	25 " "
Excavation, Class 1, below mean low water	22a	60 " "
Excavation, Class 2, below mean low water	*23a	5 " "
Excavation, Class 3, below mean low water	*24a	5 " "
Backfilling	*37	50 " "
Concrete	41	1,100 " "
Concrete below mean low water	*41a	50 " "
Cement	50	1,720 bbls.
Reinforcing steel	51	28,000 lbs.
Furnishing vitrified pipe	55	List price, $120
Laying vitrified pipe	56	1,800 inch-ft.
Crushed rock and gravel	*60	50 cu. yds.
Timber piles	72	100 lin. ft.
Miscellaneous iron and steel	82	500 lbs.

Table 17.—Estimate of Quantities—Local Flood Protection at Miamisburg (Continued)

Flood Gate Structures	Item	Estimated Quantity
Excavation, Class 1	22	300 cu. yds.
Excavation, Class 2	*23	50 " "
Excavation, Class 3	*24	50 " "
Excavation, Class 1, below mean low water	22a	60 " "
Excavation, Class 2, below mean low water	*23a	5 " "
Excavation, Class 3, below mean low water	*24a	5 " "
Concrete	46	650 " "
Cement	50	1,050 bbls.
Reinforcing steel	51	7,000 lbs.
Timber piles	72	100 lin. ft.
Steel sheet piling	74	13 tons
Flood gates	77	40,600 lbs.
Miscellaneous iron and steel	82	2,000 "
Drainage System		
Excavation, open ditch, Class 1	16	700 cu. yds.
Excavation, open ditch, Class 2	17	200 " "
Excavation, open ditch, Class 3	18	100 " "
Excavation, Class 1, and backfilling for trenches	25	3,800 " "
Excavation, Class 2, and backfilling for trenches	*26	200 " "
Excavation, Class 3, and backfilling for trenches	*27	10 " "
Concrete aprons	43	10 " "
Concrete in culverts and gate chambers	46	140 " "
Concrete in sewers, manholes and catch basins	47	660 " "
Cement	50	1,230 bbls.
Reinforcing steel	51	15,000 lbs.
Furnishing vitrified pipe	55	List price, $1710
Laying vitrified pipe	56	16,200 inch-ft.
Timber piles	72	100 lin. ft.
Furnishing cast iron pipe	75	5.6 tons
Laying cast iron pipe	76	1,400 inch-ft.
Flood gates	77	35,500 lbs.
Miscellaneous iron and steel	82	8,000 "
Street and Railroad Modifications		
Excavation, Class 1	19	25,000 cu. yds.
Gravel paving	61	3,830 sq. yds.
Water-bound macadam paving	62	600 " "
Brick paving, on concrete foundation	64	800 " "
Guard rails	67	200 lin. ft.
General		
Excavation, Class 1, miscellaneous	*28	10 cu. yds.
Excavation, Class 2, miscellaneous	*29	10 " "
Excavation, Class 3, miscellaneous	*30	10 " "
Cleaning up	85	1 job

Table 18.—Estimate of Quantities—Local Flood Protection at Chautauqua

Levee Construction	Item	Estimated Quantity
Clearing and grubbing	2	0.5 acre
Removal of buildings	3	1 job
Soil stripping	5	450 cu. yds.
Embankment, Class E (from borrow)	35	8,250 " "
Surface dressing and grassing	38	900 " "
Cleaning up	85	1 job

Table 19.—Estimate of Quantities—Local Flood Protection at Franklin

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	5 acres
Trimming slopes	4	5,400 sq. yds.
Excavation, Class 1	9	120,000 cu. yds.
Excavation, Class 2	*10	500 " "
Excavation, Class 3	*11	100 " "
Levee Construction		
Clearing and grubbing, east side of river	2	1 acre
Clearing and grubbing, west side of river	2	1 "
Removal of buildings, east side of river	3	1 job
Removal of buildings, west side of river	3	1 "
Soil stripping, east side of river	5	10,300 cu. yds.
Soil stripping, west side of river	5	200 " "
Embankment, Class D, east side of river	34	52,200 " "
Embankment, Class E, east side of river	35	10,100 " "
Embankment, Class E, west side of river	35	64,500 " "
Surface dressing and grassing, east side of river	38	5,700 " "
Surface dressing and grassing, west side of river	38	5,600 " "
Revetment		
Concrete in monolithic slope revetment	44	250 " "
Concrete in monolithic slope revetment, below mean low water	44a	50 " "
Cement	50	450 bbls.
Reinforcing steel	51	12,000 lbs.
Timber piles	72	2,900 lin. ft.
Miscellaneous iron and steel	82	500 lbs.
Retaining Walls		
Excavation, Class 1	22	150 cu. yds.
Excavation, Class 2	*23	30 " "
Excavation, Class 3	*24	20 " "
Excavation, Class 1, below mean low water	*22a	40 " "
Excavation, Class 2, below mean low water	*23a	20 " "
Excavation, Class 3, below mean low water	*24a	10 " "
Backfilling	37	10 " "
Concrete	*41	50 " "
Concrete below mean low water	*41a	10 " "
Cement	50	90 bbls.
Reinforcing steel	51	1,200 lbs.
Furnishing vitrified pipe	55	List price, $30
Laying vitrified pipe	56	600 inch-ft.
Crushed rock or gravel	*60	10 cu. yds
Timber piles	72	100 lin. ft
Miscellaneous iron and steel	82	200 lbs.

Table 19.—Estimate of Quantities—Local Flood Protection at Franklin (Continued)

Flood Gate Structures	Item	Estimated Quantity
Excavation, Class 1	22	200 cu. yds.
Excavation, Class 2	*23	30 " "
Excavation, Class 3	*24	30 " "
Excavation, Class 1, below mean low water	*22a	60 " "
Excavation, Class 2, below mean low water	*23a	20 " "
Excavation, Class 3, below mean low water	*24a	20 " "
Concrete	46	460 " "
Concrete below mean low water	46a	35 " "
Cement	50	740 bbls.
Reinforcing steel	51	5,000 lbs.
Timber piles	72	150 lin. ft.
Steel sheet piling	74	10 tons
Flood gates	77	34,000 lbs.
Miscellaneous iron and steel	82	1,000 "
Drainage System		
Excavation, Class 1, and backfilling for trenches	25	150 cu. yds.
Excavation, Class 2, and backfilling for trenches	*26	20 " "
Excavation, Class 3, and backfilling for trenches	*27	20 " "
Concrete aprons	43	5 " "
Concrete culverts and gate chambers	46	70 " "
Concrete sewers, manholes and catch basins	47	15 " "
Cement	50	145 bbls.
Reinforcing steel	51	1,500 lbs.
Furnishing vitrified pipe	55	List price, $975
Laying vitrified pipe	56	7,200 inch-ft.
Furnishing cast iron pipe	75	3 tons
Laying cast iron pipe	76	600 inch-ft.
Flood gates	77	10,000 lbs.
Miscellaneous iron and steel	82	4,000 "
Street and Railroad Modifications		
Excavation for street fills	19	27,000 cu. yds.
Gravel paving	61	2,900 sq. yds.
Water-bound macadam paving	62	700 " "
Guard rails	67	2,000 lin. ft.
General		
Excavation, Class 1, miscellaneous	*28	100 cu. yds.
Excavation, Class 2, miscellaneous	*29	10 " "
Excavation, Class 3, miscellaneous	*30	10 " "
Cleaning up	85	1 job

Table 20.—Estimate of Quantities—Local Flood Protection at Middletown

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Excavation for new channel, Class 1	6	36,000 cu. yds.
Excavation for new channel, Class 1	6a	16,000 " "
Excavation for new channel, Class 2	7	10,000 " "
Excavation for new channel, Class 2	7a	3,000 " "
Levee Construction		
East Side		
Clearing and grubbing	2	2 acres
Removal of buildings	3	1 job
Excavation, soil stripping	5	5,000 cu. yds.
Embankment, Class D, (from cut)	34	30,000 " "
Embankment, Class E, (from borrow)	35	70,000 " "
Surface dressing and grassing	38	10,000 " "
West Middletown		
Clearing and grubbing	2	0.5 acre
Removal of buildings	3	1 job
Soil stripping	5	200 cu. yds.
Embankment, Class D (from cut)	34	1,600 " "
Surface dressing and grassing	38	200 " "
Revetment		
Concrete in monolithic slope revetment	*44	20 " "
Concrete in same below low water level	*44a	5 " "
Cement	*50	40 bbls.
Reinforcing steel	*51	2,000 lbs.
Timber piles	*72	250 ft.
Retaining Walls		
Excavation, Class 1	*22	450 cu. yds.
Excavation, Class 2	*23	40 " "
Excavation, Class 2, below mean low water level	*23a	10 " "
Backfilling	*37	10 " "
Concrete	*41	50 " "
Cement	*50	100 bbls.
Flood Gate Structures		
Excavation, Class 1	22	450 cu. yds.
Excavation, Class 1, below mean low water	22a	50 " "
Concrete in gate chambers, etc	46	270 " "
Concrete in same, below mean low water level	46a	60 " "
Cement	50	420 bbls.
Steel sheet piling	74	9 tons
Flood gates	77	32,500 lbs.
Hand rails (miscellaneous iron and steel)	82	2,000 "

Table 20.—Estimate of Quantities—Local Flood Protection at Middletown (Continued)

	Item	Estimated Quantity
Drainage System		
East Side		
Excavation, Class 1	*16	10 cu. yds.
Excavation, Class 2	*17	10 " "
Excavation, Class 3	*18	10 " "
Excavation and backfilling, Class 1	25	60 " "
Excavation and backfilling, Class 2	26	20 " "
Excavation and backfilling, Class 3	27	20 " "
Concrete in culverts, etc.	46	30 " "
Cement	50	50 bbls.
Reinforcing steel	51	1,000 lbs.
Furnishing vitrified pipe	55	List price, $180
Laying vitrified pipe	56	1,800 inch-ft.
Furnishing cast iron pipe	75	2 tons
Laying cast iron pipe	76	500 inch-ft.
Flood gates	77	1,000 lbs.
West Middletown		
Excavation, Class 1	*16	10 cu. yds.
Excavation for streets and highways, Class 1	19	30 " "
Excavation and backfilling, Class 1	*25	40 " "
Excavation and backfilling, Class 2	*26	10 " "
Excavation and backfilling, Class 3	*27	10 " "
Concrete in culverts, etc.	46	100 " "
Cement	50	120 bbls.
Reinforcing steel	51	5,400 lbs.
Furnishing vitrified pipe	55	List price, $100
Laying vitrified pipe	56	1,200 inch-ft.
Furnishing cast iron pipe	75	1 ton
Laying cast iron pipe	76	300 inch-ft.
Flood gates (flap valve)	77	500 lbs.
Street and Railroad Modification		
East Side		
Excavation, Class 1	19	2,000 cu. yds.
Gravel paving	61	250 sq. yds.
Brick paving on concrete foundation	64	400 " "
Guard rails	*67	200 ft.
West Middletown		
Excavation, Class 1	19	800 cu. yds.
Gravel paving	61	1,000 sq. yds.
Guard rails	*67	800 ft.
General		
Excavation—miscellaneous, Class 1	*28	10 cu. yds.
Excavation—miscellaneous, Class 2	*29	10 " "
Excavation—miscellaneous, Class 3	*30	10 " "
Cleaning up	85	1 job

Table 21.—Estimate of Quantities—Local Flood Protection at Hamilton

* Indicates that the items and quantities are inserted because it is desired to obtain prices for them in the bid. They may or may not be required, depending on conditions which may arise during construction.

Improvement of River Channel	Item	Estimated Quantity
Clearing and grubbing	2	60 acres
Removal of buildings	3	1 job
Trimming and shaping slope of river channels	4	156,800 sq. yds.
Soil stripping	5	2,000 cu. yds.
Earth excavation, Class 1, for new channels	6	67,000 " "
Mixed excavation, Class 2, for new channels	7	500 " "
Rock excavation, Class 3, for new channels	8	500 " "
Earth excavation, Class 1, for same, below mean low water	6a	15,000 " "
Mixed excavation, Class 2, for same, below mean low water	7a	500 " "
Rock excavation, Class 3, for same, below mean low water	8a	500 " "
Earth excavation, Class 1, in river channel	9	1,945,000 " "
Mixed excavation, Class 2, in river channel	10	3,000 " "
Rock excavation, Class 3, in river channel	11	2,000 " "
Overhaul per 100 feet	12	9,750,000 " "
Surface dressing and grassing	38	23,500 " "
Steel sheet piling	74	190 tons
Levee Construction		
Clearing and grubbing	2	2 acres
Removal of buildings	3	1 job
Soil stripping	*5	11,000 cu. yds.
Embankment, Class D, from river excavation	*34	270,000 " "
Embankment, Class E, from borrow pits	*35	13,000 " "
Surface dressing and grassing	*38	33,000 " "
Revetment		
Concrete in monolithic slope revetment	44	9,600 " "
Concrete in monolithic slope revetment below mean low water	44a	200 " "
Concrete in flexible slab revetment	45	9,000 " "
Cement	50	27,000 bbls.
Reinforcing steel	*51	1,146,300 lbs.
Timber piles	72	44,000 lin. ft.
Steel sheet piling	74	300 tons
Miscellaneous iron and steel	82	188,300 lbs.

Table 21.—Estimate of Quantities—Local Flood Protection at Hamilton (Continued)

Retaining Walls	Item	Estimated Quantity
Earth excavation, Class 1	22	15,900 cu. yds.
Mixed excavation, Class 2	23	570 " "
Rock excavation, Class 3	24	1,400 " "
Earth excavation, Class 1, below mean low water	22a	9,100 " "
Mixed excavation, Class 2, below mean low water	23a	400 " "
Rock excavation, Class 3, below mean low water	24a	1,100 " "
Backfilling	37	300 " "
Concrete	41	6,450 " "
Concrete below mean low water	41a	5,600 " "
Stone masonry	48	100 " "
Cement	50	18,700 bbls.
Reinforcing steel	51	241,000 lbs.
Furnishing vitrified pipe	55	List price, $60
Laying vitrified pipe	56	1,200 inch-ft.
Crushed rock or gravel	60	300 cu. yds.
Timber piles	72	20,800 lin. ft.
Miscellaneous iron and steel	82	4,000 lbs.
Drainage System		
Excavation, (open ditch) Class 1	16	1,000 cu. yds.
Excavation, (open ditch) Class 2	17	200 " "
Excavation, (open ditch) Class 3	18	50 " "
Excavation, Class 1, and backfilling for trenches	25	1,600 " "
Excavation, Class 2, and backfilling for trenches	26	170 " "
Excavation, Class 3, and backfilling for trenches	27	70 " "
Excavation, Class 1, and backfilling for trenches, below mean low water	25a	100 " "
Excavation, Class 2, and backfilling for trenches, below mean low water	26a	70 " "
Excavation, Class 3, and backfilling for trenches, below mean low water	27a	25 " "
Concrete aprons	43	10 " "
Concrete culverts and gate chambers	46	200 " "
Concrete culverts and gate chambers, below mean low water	46a	5 " "
Concrete sewers, manholes and catch basins	47	3,000 " "
Cement	50	5,500 bbls.
Reinforcing steel	51	59,000 lbs.
Vitrified brick lining	52	25 cu. yds.
Furnishing vitrified pipe	55	List price, $2200
Laying vitrified pipe	56	21,600 inch-ft.
Crushed rock or gravel	60	100 cu. yds.
Bituminous-bound paving	63	500 sq. yds.
Asphalt paving	66	4,000 " "

Table 21.—Estimate of Quantities—Local Flood Protection at Hamilton (Continued)

Drainage System—(Continued)	Item	Estimated Quantity
Timber and lumber	71	1,000 ft. B. M.
Timber piles	72	3,000 lin. ft.
Furnishing cast iron pipe	75	10 tons
Laying cast iron pipe	76	2,200 inch-ft.
Flood gates	77	40,000 lbs.
Miscellaneous iron and steel	82	15,000 "
Bridge Protection		
Mixed excavation, Class 2	23	30 cu. yds.
Concrete	41	25 " "
Cement	50	30 bbls.
Steel sheet piling	74	210 tons
Street and Railroad Modifications		
Earth excavation for fills, Class 1	*19	7,000 cu. yds.
Paving, water-bound macadam	62	2,800 sq. yds.
Paving, brick on concrete foundation	64	450 " "
Guard rails	*67	400 lin. ft.
General		
Earth excavation, Class 1, miscellaneous	28	1,000 cu. yds.
Mixed excavation, Class 2, miscellaneous	29	500 " "
Rock excavation, Class 3, miscellaneous	30	500 " "
Cleaning up	85	1 job

Table 22.—Estimate of Cost—Retarding Basins—Dams and Appurtenances.

(Including summary of estimate of quantities)

Item	Description	Unit	Estimated Quantities						Est. Unit Price	Amount
			German-town	Engle-wood	Lock-ington	Taylors-ville	Huff-man	Total		
1	Stream Control	Job	1	1	1	1	1	.....	.....	$ 32,000
2	Clearing and grubbing	Acres	14	5	10	21	14	64	$150.00	9,600
3	Removal of buildings	Job	.....	1	1	1	1	.....	.....	2,200
5	Excavation, soil stripping	Cu. yd.	20,000	100,000	42,000	34,000	46,000	242,000	0.35	84,700
6	Excavation, Class 1, for cutoff trench and stream control channel	" "	10,000	114,700	65,000	39,000	57,400	286,100	0.30	85,830
7	Excavation, Class 2, for same	" "	2,000	10,000	3,000	10,000	10,000	35,000	0.60	21,000
8	Excavation, Class 3, for same	" "	1,000	5,000	2,000	5,000	5,000	18,000	1.25	22,500
6a	Excavation, Class 1, for same, below mean low water	" "	17,000	39,500	33,000	56,000	116,400	261,900	0.50	130,950
7a	Excavation, Class 2, for same, below mean low water	" "	1,000	10,000	2,000	5,000	5,000	23,000	0.90	20,700
8a	Excavation, Class 3, for same, below mean low water	" "	500	1,000	1,000	1,000	1,000	4,500	3.00	13,500
13	Excavation, Class 1, for outlet works and spillways	" "	135,000	156,000	74,000	450,000	33,000	848,000	0.30	254,400
14	Excavation, Class 2, for same	" "	2,000	20,000	2,000	216,000	122,000	362,000	0.60	217,200
15	Excavation, Class 3, for same	" "	14,000	15,000	1,000	3,000	5,000	38,000	1.83	69,500
13a	Excavation, Class 1, for same, below mean low water	" "	5,500	3,500	28,000	35,000	4,000	76,000	0.40	30,400
14a	Excavation, Class 2, for same, below mean low water	" "	1,000	17,000	1,000	91,000	38,000	148,000	0.90	133,200
15a	Excavation, Class 3, for same, below mean low water	" "	12,500	3,000	4,500	2,000	3,000	25,000	2.62	65,500
16	Excavation, Class 1, for minor drainage systems	" "	1,000	3,500	1,400	1,200	1,600	8,700	0.30	2,610
17	Excavation, Class 2, for same	" "	1,000	2,000	200	400	500	4,100	1.00	4,100
18	Excavation, Class 3, for same	" "	500	1,000	100	200	300	2,100	3.00	6,300
28	Excavation, Class 1, miscellaneous	" "	2,000	5,000	1,000	5,000	5,000	18,000	0.30	5,400

29	Excavation, Class 2, miscellaneous	" "	1,000	3,000	500	2,000	3,000	9,500	0.60	5,700
30	Excavation, Class 3, miscellaneous	" "	500	1,000	200	1,000	1,000	3,700	1.25	4,625
31	Embankment, Class A	" "	647,000	3,500,000	840,000	580,000	1,360,000	6,927,000	0.25	1,731,750
32	Embankment, Class B	" "	187,000	400,000	240,000	610,000	250,000	1,687,000	0.25	421,750
33	Embankment, Class C	" "	10,000	18,000	10,000	10,000	20,000	68,000	0.45	30,600
36	Embankment, Class F	" "	5,000	30,000	5,000	10,000	10,000	60,000	0.25	15,000
37	Backfilling	" "	15,500	20,000	15,000	14,000	2,600	67,100	0.50	33,550
38	Surface dressing and grassing	" "	21,000	82,000	45,000	35,000	45,000	228,000	0.50	114,000
41	Concrete in outlet works, spillways, etc.	" "	11,470	27,270	26,000	27,000	23,440	115,180	5.50	633,490
41a	Concrete in same, below mean low water	" "	4,640	5,230	7,500	10,000	7,560	34,930	6.50	227,045
42	Concrete in conduit linings	" "	1,400	2,100	200	800	300	4,800	13.20	63,300
43	Concrete in aprons and paving	" "	1,150	1,500	0	0	0	2,650	5.00	13,250
43a	Concrete in same, below mean low water	" "	2,450	2,500	3,800	12,000	9,500	30,250	6.00	181,500
50	Cement	Bbls.	37,000	62,000	61,000	80,000	65,000	305,000	1.60	488,000
51	Reinforcing steel	Lbs.	250,000	550,000	35,000	400,000	200,000	1,435,000	0.04	57,400
52	Vitrified brick lining	Cu. yd.	252	392	36	84	70	834	12.50	10,425
53	Drilling foundations or masonry	Lin. ft.	1,000	10,000	5,000	5,000	10,000	31,000	0.75	23,250
54	Grouting foundations or masonry	Cu. yd.	200	2,000	1,000	1,000	2,000	6,200	5.00	31,000
55	Furnishing vitrified round or channel pipe	Lin. ft.	6,700	24,000	10,000	13,000	17,300	71,000	0.15	10,650
55	Furnishing vitrified round or channel pipe specials	Pieces	30	50	30	60	100	270	0.50	135
56	Laying vitrified round or channel pipe	Lin. ft.	6,760	24,100	10,060	13,120	17,500	71,540	0.10	7,154
57	Dry rubble paving	Cu. yd.	700	1,800	1,600	2,500	1,800	8,400	2.50	21,000
58	Riprap	" "	2,300	19,000	2,200	5,500	8,000	37,000	1.50	55,500
59	Gutter paving	Sq. yd.	900	3,000	1,600	1,100	1,400	8,000	1.50	12,000
60	Crushed rock or gravel	Cu. yd.	1,000	1,000	1,000	1,000	1,000	5,000	2.00	10,000
70	Protective boom and accessories, lumber	M.ft.B.M	17	30	22	28	22	119	50.00	5,950
71	Timber and lumber, miscellaneous	"	10	20	10	10	15	65	50.00	3,250
72	Timber piles less than 20 ft. long	Lin. ft.	1,000	3,000	3,000	3,000	3,000	13,000	0.50	6,500
72x	Timber piles more than 20 ft. long	" "	1,000	2,000	2,000	2,000	2,000	9,000	0.60	5,400
73	Wood sheet piling	M.ft.B.M	30	140	140	120	156	586	50.00	29,300
74	Steel sheet piling	Tons	90	380	380	350	455	1,655	70.00	115,850
82	Miscellaneous cast iron, wrought iron and steel	Lbs.	26,000	80,000	50,000	60,000	82,400	298,400	0.05	14,920
83	Bronze	"	30,000	33,000	0	0	0	63,000	0.30	18,900
85	Cleaning up	Job	1	1	1	1	1	.....	.....	80,000

Estimated Total for Dams and Appurtenances - $5,693,734

Table 23.—Estimate of Cost—Retarding Basins—Roads and Bridges

(Including summary of estimate of quantities)

Item	Description	Unit	Estimated Quantities						Est. Unit Price	Amount
			Germantown	Englewood	Lockington	Taylorsville	Huffman	Total		
2	Clearing and grubbing	Acre	2	3.5	6	3	2	16.5	$150.00	$ 2,475
19	Excavation, Class 1, for street and highway cuts and fills	Cu. yd.	28,100	248,100	55,000	51,400	126,000	508,600	0.375	190,725
20	Excavation, Class 2, for same	" "	2,600	2,200	540	400	800	6,540	0.70	4,578
21	Excavation, Class 3, for same	" "	200	2,700	420	200	300	3,820	1.25	4,775
22	Excavation, Class 1, for retaining walls, bridge piers, etc	" "	.....	2,550	300	600	140	3,590	0.50	1,795
23	Excavation, Class 2, for same	" "	.....	440	70	100	60	670	0.70	469
24	Excavation, Class 3, for same	" "	.....	780	60	40	100	980	1.25	1,225
22a	Excavation, Class 1, for same, below mean low water	" "	.....	800	.....	.....	.....	800	2.50	2,000
23a	Excavation, Class 2, for same, below mean low water	" "	.....	130	.....	.....	.....	130	4.00	520
24a	Excavation, Class 3, for same, below mean low water	" "	.....	60	.....	.....	.....	60	6.00	360
37	Backfilling	" "	70	2,740	480	660	310	4,260	0.50	2,130
41	Concrete in retaining walls, bridge piers, and similar structures	" "	.....	2,050	260	900	190	3,400	6.50	22,100
41a	Concrete in same, below mean low water	" "	.....	700	.....	.....	.....	700	7.50	5,250

46	Concrete in culverts, bulkheads, gate chambers, and similar structures	" "	70	230	300	120	280	1,000	7.50	7,500
50	Cement	Bbls.	115	4,655	925	1,600	745	8,040	1.60	12,864
51	Reinforcing steel	Lbs.	2,400	111,750	15,300	5,100	17,000	151,550	0.04	6,062
55	Furnishing vitrified pipe, 12"	Lin. ft.	100	180	60	60	200	600	0.35	210
55	Furnishing vitrified pipe, 18"	" "	70	110	310	50	200	740	0.70	518
58	Riprap	Cu. yd.	.....	350	.....	.....	.....	350	1.50	525
60	Crushed rock or gravel	" "	1,500	2,220	4,800	2,100	2,300	12,920	0.75	9,690
61	Gravel paving for streets and highways	Sq. yd.	.....	14,800	.....	2,300	41,000	58,100	0.50	29,050
62	Waterbound macadam paving for same	" "	.....	1,500	.....	.....	.....	1,500	0.90	1,350
67	Guard rails	Lin. ft.	4,400	16,800	17,900	10,800	13,700	63,600	0.35	22,260
68	Wire fences	" "	15,400	29,800	36,600	22,000	41,800	145,600	0.075	10,920
71	Timber and lumber, miscellaneous	M.ft.B.M	0.2	0.4	1.2	0.4	0.6	2.8	50.00	140
72	Timber piles, less than 20 ft. long	Lin. ft.	.....	2,600	.....	.....	.....	2,600	0.50	1,300
78	Steel highway bridges	Job	1	1	1	1	1	.....	.....	29,010
81	Raising, removing and re-erecting existing steel bridges	"	.....	1	.....	.....	.....	.....	.....	7,050
82	Miscellaneous cast iron, wrought iron and steel	Lbs.	1,800	6,080	9,800	3,600	12,800	34,080	0.075	2,556

Estimated Total for Roads and Bridges - - $379,407

Table 24.—Estimate of Cost—Retarding Basins—Protection for Tippecanoe City and Fairfield

(Including summary of estimate of quantities)

Item	Description	Unit	Estimated Quantities						Est. Unit Price	Amount
			Germantown	Englewood	Lockington	Taylorsville	Huffman	Total		
2	Clearing and grubbing	Acre	.....	.....	.....	10	3	13	$150.00	$ 1,950.00
3	Removal of buildings	Job	.....	.....	.....	1	1	.....	.....	600.00
5	Excavation, soil stripping	Cu. yd.	.....	.....	.....	10,200	6,500	16,700	0.35	5,845.00
16	Excavation, Class 1, open ditch	" "	.....	.....	.....	10,000	50	10,050	0.30	3,015.00
17	Excavation, Class 2, open ditch	" "	.....	.....	.....	200	5	205	1.00	205.00
18	Excavation, Class 3, open ditch	" "	.....	.....	.....	50	2	52	2.00	104.00
19	Excavation, Class 1, for street and highway cuts and fills	" "	.....	.....	.....	10,500	8,650	19,150	0.40	7,660.00
20	Excavation, Class 2, for street and highway cuts and fills	" "	.....	.....	.....	100	55	155	0.75	116.25
21	Excavation, Class 3, for street and highway cuts and fills	" "	.....	.....	.....	120	12	132	1.25	165.00
23	Excavation, Class 2, for retaining walls	" "	.....	.....	.....	10	20	30	1.25	37.50
23a	Excavation, Class 2, for retaining walls, below mean low water	" "	.....	.....	.....	5	.....	5	3.00	15.00
25	Excavation, Class 1, and backfilling for trenches	" "	.....	.....	.....	14,000	50	14,050	1.00	14,050.00
26	Excavation, Class 2, and backfilling for trenches	" "	.....	.....	.....	300	10	310	1.50	465.00
27	Excavation, Class 3, and backfilling for trenches	" "	.....	.....	.....	100	5	105	4.00	420.00

28	Excavation, Class 1, miscellaneous	" "				10	50	60	0.50	30.00
29	Excavation, Class 2, miscellaneous	" "				10	5	15	1.00	15.00
30	Excavation, Class 3, miscellaneous	" "				10	2	12	1.50	18.00
35	Embankment, Class E (from borrow pits)	" "				220,000	65,000	285,000	0.40	114,000.00
37	Backfilling	" "				10		10	0.50	5.00
38	Surface dressing and grassing	" "				11,000	6,000	17,000	0.50	8,500.00
41	Concrete	" "				5	10	15	5.50	82.50
43	Concrete apron	" "				50		50	5.00	250.00
46	Concrete in culverts, etc	" "				2,400	200	2,600	7.00	18,200.00
47	Concrete in manholes, etc	" "				50		50	7.00	350.00
50	Cement	Bbls.				3,480	350	3,830	1.60	6,128.00
51	Reinforcing steel	Lbs.				41,000	5,000	46,000	0.04	1,840.00
55	Furnishing vitrified pipe	List pr.				$806	$68	$874	65% off	305.90
56	Laying vitrified pipe	Inch-ft				9,000	720	9,720	0.01	97.20
61	Gravel paving for streets and highways	Sq. yd.					10,000	10,000	0.50	5,000.00
62	Macadam paving	" "				2,900		2,900	0.90	2,610.00
65	Concrete paving	" "				2,100		2,100	1.00	2,100.00
67	Guard rails	Lin. ft.				1,000	5,000	6,000	0.35	2,100.00
72	Timber piles	" "				100		100	0.50	50.00
75	Furnishing cast iron pipe	Tons				3	1	4	25.00	100.00
76	Laying cast iron pipe	Inch-ft				580	220	800	0.03	24.00
77	Flood gates	Lbs.				11,000	10,000	21,000	0.09	1,890.00
82	Miscellaneous cast iron, wrought iron and steel	"				15,000	1,000	16,000	0.05	800.00
85	Cleaning up	Job				1	1			600.00

Estimated Total for Protection for Tippecanoe City and Fairfield - $199,743.35

Note.—For **Table 25, Estimate of Cost, Local Flood Protection,** see inserts facing this page.

Table 26.—GENERAL SUMMARY OF COST

Retarding Basins		
Dams and Appurtenances (See Table 22)	$5,693,734	
Roads and Bridges (See Table 23)	379,407	
Protection for Tippecanoe City and Fairfield (See Table 24)	199,743	
Total for Retarding Basins		$ 6,272,884
Local Flood Protection (See Table 25)		3,335,303
Total estimated cost of construction of the works included in the plan		**$ 9,608,187**
Public Service Relocations and Damages		2,309,315
Real Estate Purchases and Easements		5,664,200
Administration and General Expense		1,758,170
Taxes and Special Assessments, during Construction Period on Lands Acquired		200,000
Total estimated cost without contingencies		**$19,539,872**
Contingencies		4,000,000
Estimated maximum total cost		**$23,539,872**

Item	Description
2	Clearing and grubbing
3	Removal of buildings
4	Trimming and shaping slopes of river channel
5	Excavation, soil stripping
6	Excavation, Class 1, for new channel
7	Excavation, Class 2, for same
8	Excavation, Class 3, for same
6a	Excavation, Class 1, for same, below mean low water
7a	Excavation, Class 2, for same, below mean low water
8a	Excavation, Class 3, for same, below mean low water
9	Excavation, Class 1, for river channel improvement
10	Excavation, Class 2, for same
11	Excavation, Class 3, for same
12	Excavation, overhaul for river channel improvement, per 100
16	Excavation, Class 1, for minor surface drainage
17	Excavation, Class 2, for same
18	Excavation, Class 3, for same
19	Excavation, Class 1, for street and highway cuts and fills
20	Excavation, Class 2, for same
21	Excavation, Class 3, for same
22	Excavation, Class 1, for retaining walls, bridge piers and fl structures
23	Excavation, Class 2, for same
24	Excavation, Class 3, for same
22a	Excavation, Class 1, for same, below mean low water
23a	Excavation, Class 2, for same, below mean low water
24a	Excavation, Class 3, for same, below mean low water
25	Excavation, Class 1, and backfilling for trenches
26	Excavation, Class 2, and backfilling for same
27	Excavation, Class 3, and backfilling for same
25a	Excavation, Class 1, and backfilling for same, below mean lc
26a	Excavation, Class 2, and backfilling for same, below mean lc
27a	Excavation, Class 3, and backfilling for same, below mean lc
28	Excavation, Class 1, miscellaneous
29	Excavation, Class 2, miscellaneous
30	Excavation, Class 3, miscellaneous
34	Embankment, Class D, for levees
35	Embankment, Class E, for levees
37	Backfilling

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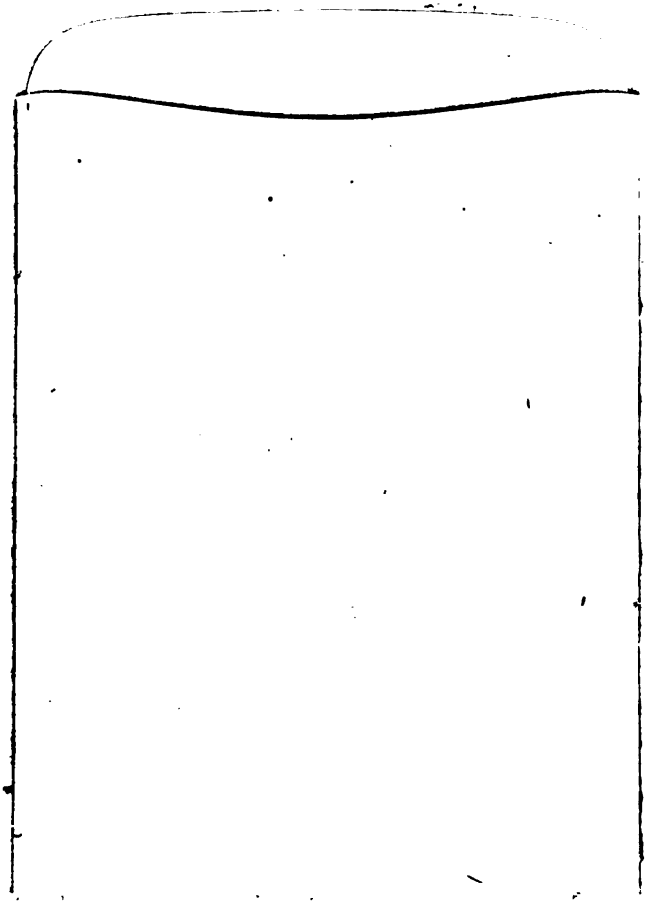

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